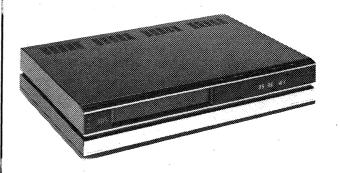
Beocord VHS91

Type 4491-4492-4493

VTR/Video Tape Recorder ATR/Audio Tape Recorder



TV System Type 4491 VHF: B

UHF: G

Colour: Pal

Sound: LF Stereo

Type 4492 UHF: I

Colour: Pal

Sound: LF Stereo

Type 4493

VHF: B (S-Tuner)

UHF: G

Colour: Pal

Sound: RF Stereo



BEOCORD VHS 91 Type 4491

System: VHF-B UHF-G

Colour: PAL and SECAM modified

Sound: LF Stereo, Dolby*

Tuner IF block 8004540 RF converter 8004542 Regulator REG 8004589 V-S Tuning VS 8004588 Top switch 8004546 Function switch FSW 8004583 Indicators IND 8004584 Infrared receiver INF 8004549 Timer TIM 8004585 Y-chrom WYC 8004577 Jack servo Main JSS 8004606 8004580 Audio AUD Demodulator DEM 8004581 Remote Control RMT 8004582

BEOCORD VHS 91 Type 4492

System: UHF-I Colour: PAL

Sound: LF Stereo, Dolby*

Tuner IF block 8004538

RF converter 8004541 V-S Tuning 8004587 Y-chroma WYC 8004576 Jack servo Main JSS 8004578

All other moduls (PCB's) as Type 4491

BEOCORD VHS 91 Type 4493

System: VHF-B S-tuner

UHF-G

Colour: PAL and SECAM modified

Sound: RF Stereo, Dolby*

Tuner IF block

8004595

Timer TIM

8004586

Jack servo Mains JSS

8004579

All other moduls (PCB's) as Type 4491

Difference between models are as shown below

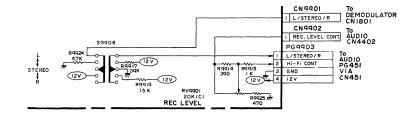
	TYPE 4491	TYPE 4492	TYPE 4493
Format	VHS PAL standard	VHS PAL standard	VHS PAL standard
Video	PAL colour (System B & G)	PAL colour (System I)	PAL colour (System B & G)
Aerial Input	VHF channels 2 - 12 UHF channels 21 - 69	UHF channels 21 — 69	VHF channels 2 – 12 UHF channels 21 – 69
RF Output	UHF channels 37 (30 – 37 adjustable) (System G)	UHF channels 37 (30 – 37 adjustable) (System I)	UHF channels 37 (30 – 37 adjustable) (System G)
Power	AC 220V 50 Hz	AC 240V 50 Hz	AC 220V 50 Hz
Timer	24 hour digital indication	24 hour digital indication	24 hour digital indication
CATV *	Not provided	Not provided	Provided

^{*}CATV Cable Television Tuner (S-tuner - Allband tuner)

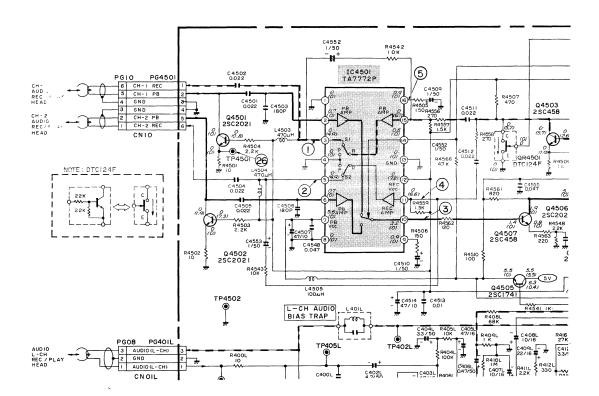
^{*} Noise reduction system manufactured under license from Dolby Laboratories. The word Dolby is a trade mark of Dolby Laboratories Licensing Corporation.

Corrections for VHS 91

Correction for FUNCTION SWITCH page 1-14 and page 1-30



Correction for AUDIO Hi-Fi LINEAR AUD. 8004580 page 1-26





Bang & Olufsen

Misprint in LINEAR AUDIO CIRCUIT ADJUSTMENT page 6-8

R-ch audio input level: RT402R Correction:

4) Adjust RT402R (R-CH INPUT LEVEL) so that the reading of the VTVM is 270 mV ± 10 mV.

L-ch audio input level: RT402L Correction:

3) Adjust RT402L (L-CH INPUT LEVEL) so that the reading of the VTVM is 270 mV \pm 10 mV.

Addition to LINEAR AUDIO CIRCUIT ADJUSTMENT page 6-8

10. E-E Audio Level Adjustment: RT501

This adjustment sets the audio modulation level during the E-E mode to the specified value.

When this adjustment is incomplete, the audio output from the TV during the E-E mode becomes noisy and difficult to hear.

Connecting test equipment

- Connect a monitor TV to the RF OUT Jack on the rear panel.
- Connect a VTVM to the audio output of the monitor

VTR condition

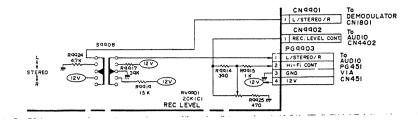
3) Set the VTR to the E-E mode.

Adjustment procedure

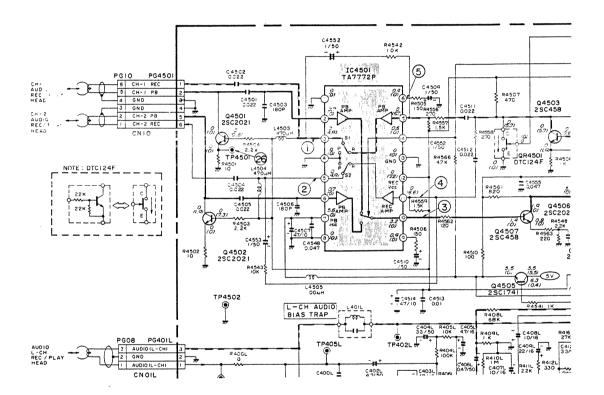
4) Adjust RT501 (on the Main P.C. board) so that the level difference between the THROUGH and E-E modes is less than ± 1 dBm based on the THROUGH mode level.

Corrections for VHS 91

Correction for FUNCTION SWITCH page 1-14 and page 1-30



Correction for AUDIO Hi-Fi LINEAR AUD. 8004580 page 1-26



Bang&Olufsen

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RF Booster. PCB	1-5	DiagramPrinted Circuit Board	1-32 1-33
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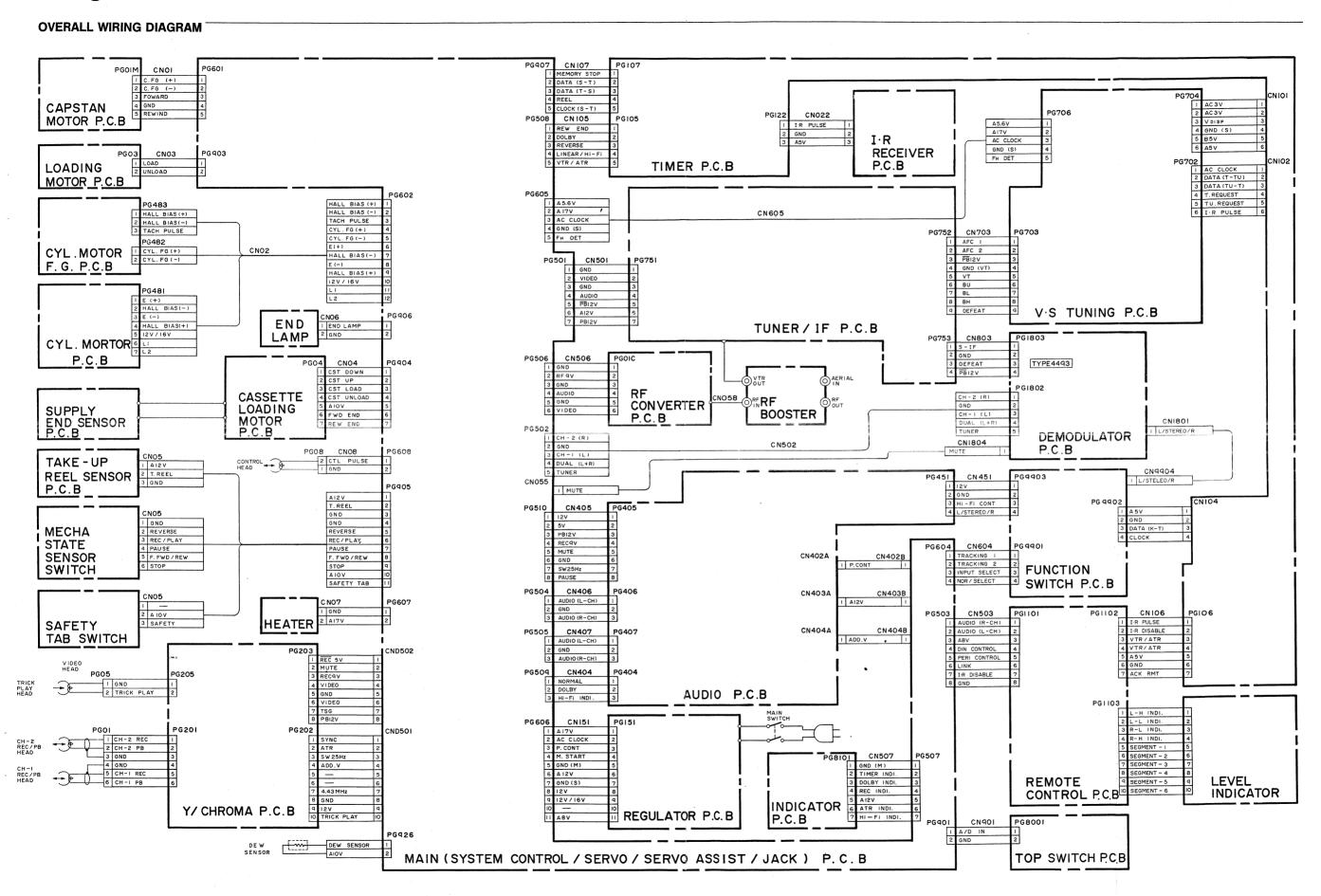
EXPLODED VIEW Cabinet..... Transport Lubrication 3-4 Cylinder...... 3-5 Cassette Loading 3-6 KNOB FUNCTION..... 4-1 SERVICING JIGS AND TOOLS..... DISASSEMBLY Removing the Case..... PC Board Locations Removing the PC Boards..... 5-4 Cassette Loading, Mechanical Parts Location...... 5-8 Removing the Cassette Loading Mechanical Parts 5-9 Main Chassis Parts Locations 5-11 Before Disassembling Parts 5-13 Removing the Main Electrical Parts 5-14 Removing the Main Mechanical Parts 5-16 ELECTRICAL CIRCUIT ADJUSTMENT Servo..... 6-1 Y-Chroma Audio Demodulator Type 4493..... Timer Type 4493..... Tuner IF Type 4491..... Tuner IF Type 4492..... 6-15 Tuner IF Type 4493..... MECHANICAL ADJUSTMENT State Switch...... 7-1 Tape Transport 7-1 Guide Pole Height 7-3 A/C Head 7-4 X Value 7-5 FM Output 7-6 Tension and Torque...... 7-6 INSULTATION TEST..... 8-1 Packing Instruction.....

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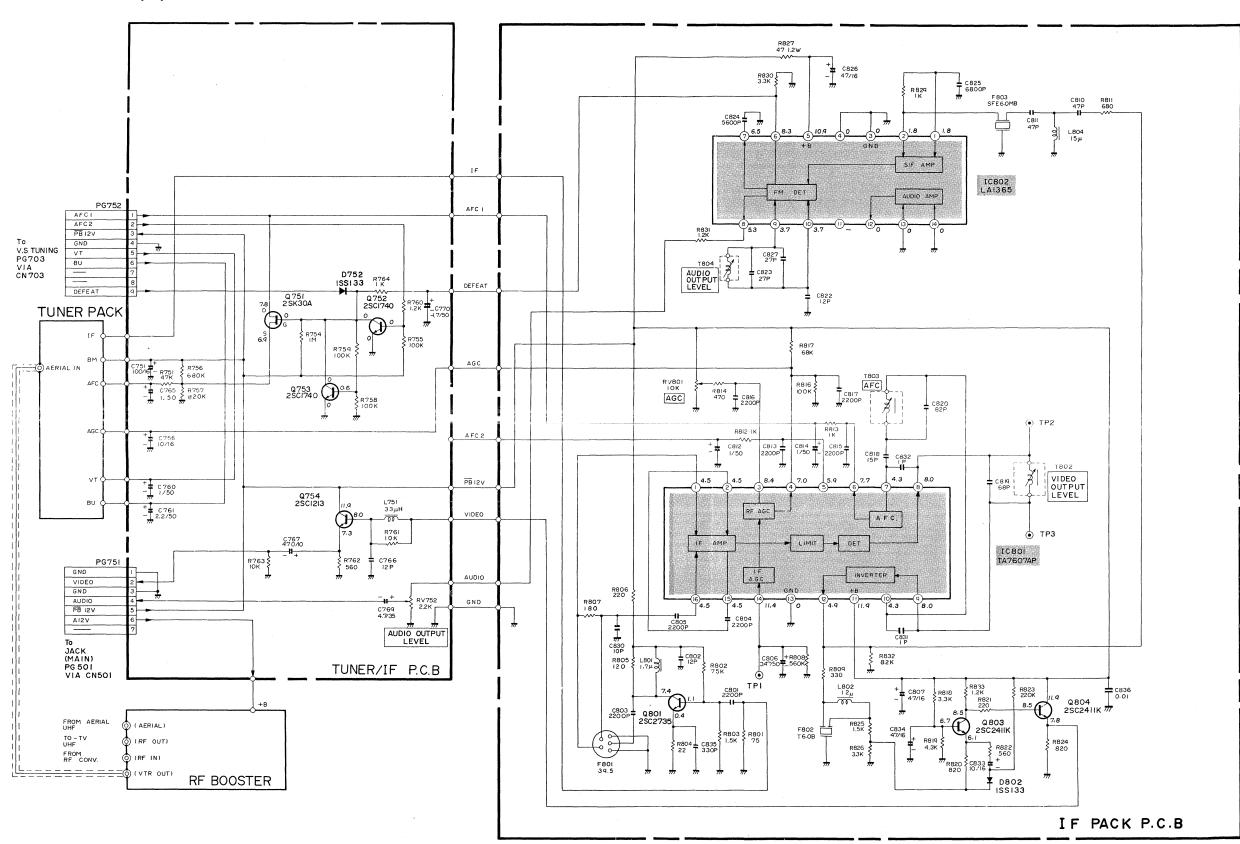
PIN SPECIFICATIONS 9-3

TECHNICAL SPECIFICATIONS 10-1

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TUNER IF BLOCK FOR UK (BS) TYPE 4492 8004538



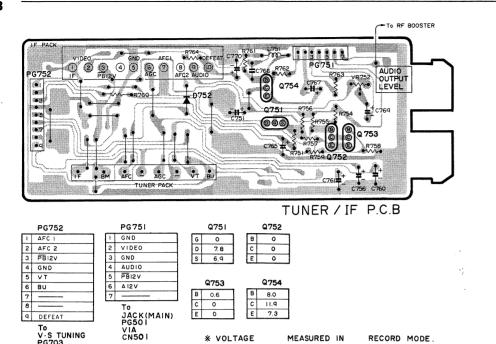
* VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

Bang&Olufsen

1-5

1-5

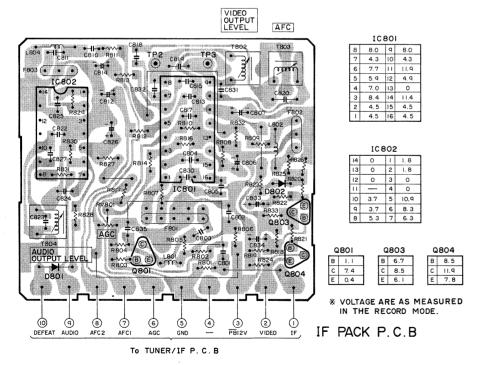
TUNER IF PCB



VHF91 TUNER/IF BOARD (1/2) TYPE 4492

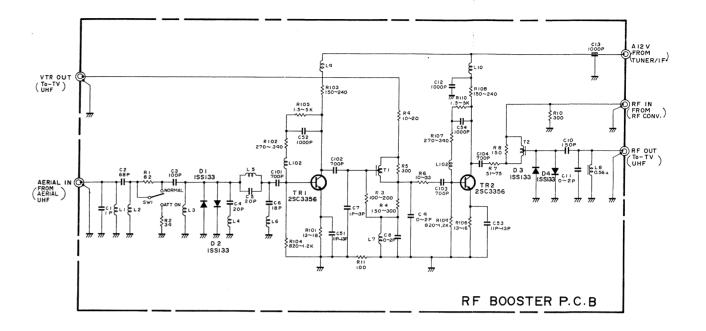
IF PACK PCB

To V·S TUNING PG703 VIA CN703



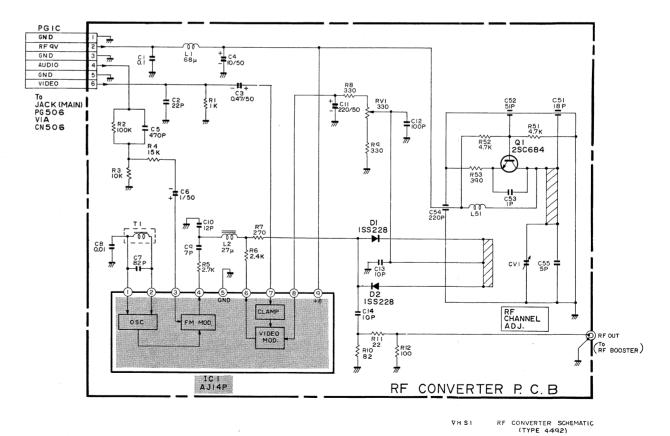
VHSQI IF PACK BOARD (1/2) TYPE4492

RF BOOSTER PCB



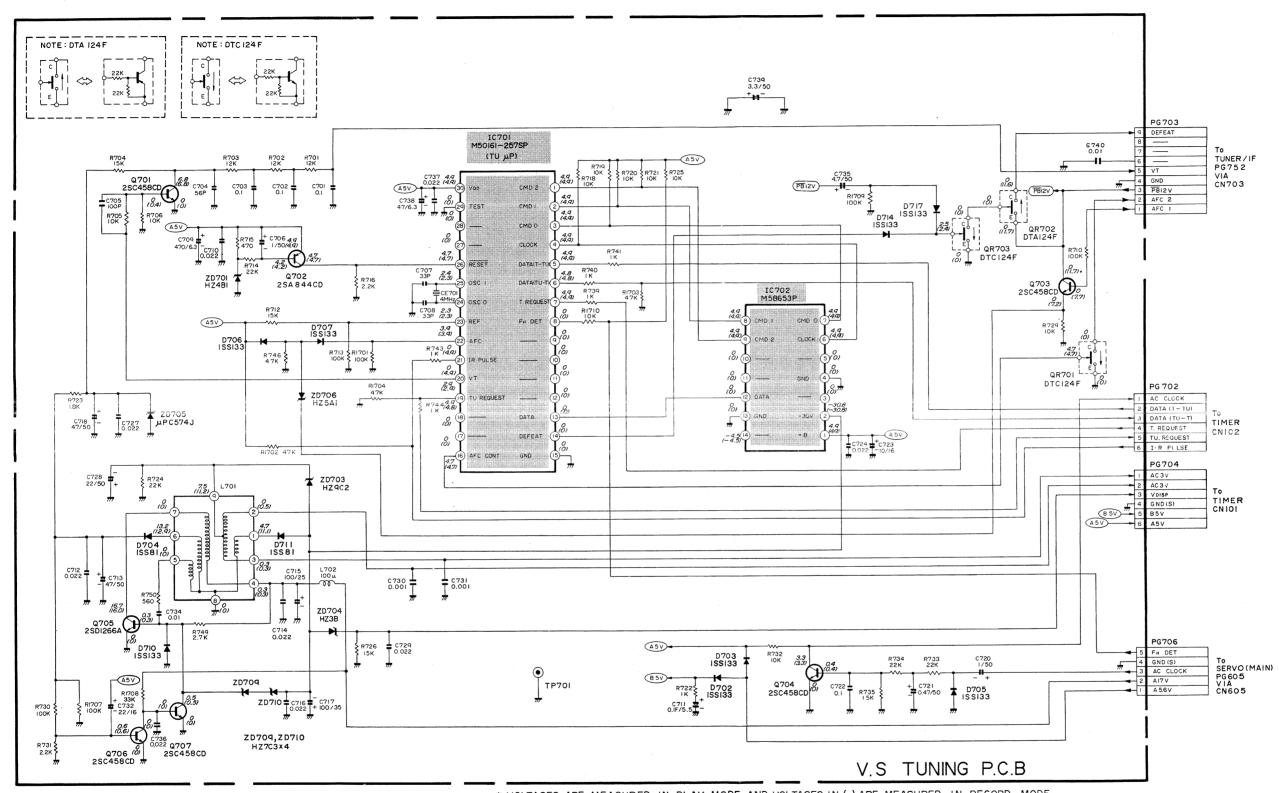
VHS 91 RF BOOSTER SCHEMATIC (TYPE 4492)

RF CONVERTER FOR UK (BS) TYPE 4492 8004541



RF Converter 8004541 is a single unit. With failure in this unit we recommend replacing.

VS TUNING FOR UK (BS) TYPE 4492 8004587



* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.

VS TUNING PCB

T 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	07/4 GR/ R720 R7/6 GO GO GO GO GO GO GO G	0706 0707 0707 0707 0707 0707 0707 0707	2D706 2D706 00 R729 40703 C 100 C	PG704 6	PG 706 A5.6V
IC70 IC702 30 4.9 (4.91) 4.9 (4.91) 4.4 (4.91) 4.4 (4.91) 4.9 (4.91) 1.4 (4	Q70I B 0 (0.4) C 6.8 (6.8) E 0 (0)	Q702 B 4.2(4.2) C 4.7(4.7) E 4.9(4.9)	Q703 B 0 (7.7) C 0 (11.7) E 0 (7.2)	6 — 7 — 8 — 9 DEFEAT TUNER / IF	
27 O(0) 4 4.9 (4.9) 26 4.7(4.7) 5 4.9(4.9) 25 24(2.3) 6 4.8(4.8) 24 2.3(2.3) 7 4.9(4.9) 23 3.4(3.9) 8 0(0) 22 0 (4.9) 9 0(0) 21 0 (4.9) 10 0 0(0)	Q704 B 0.4(0.4) C 3.3(3.3) E 0 (0)	Q705 B (0.3(0.3) C (6.7(16) E (0.0)	Q706 B 0.6 (0.6) C 0 (0) E 0 (0)	PG752 VIA CN703	
20 0 (4,41) 0 (0) 20 (0) 20 (2) (2) 1 1 0 (0)	Q 707 B 0 (0) C 0.5(0.5) E 0 (0)	QR70I B 4.7(4.7) C 0 (0) E 0 (0)	QR702 B 0 (0) C 0(11.6) E 0(11.7)	QR703 B 2.5(2.4) C 0 (0) E 0 (0)	

* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.

VHSQI V-S TUNING BOARD (TYPE 4492) 1/2

1-7

1-7

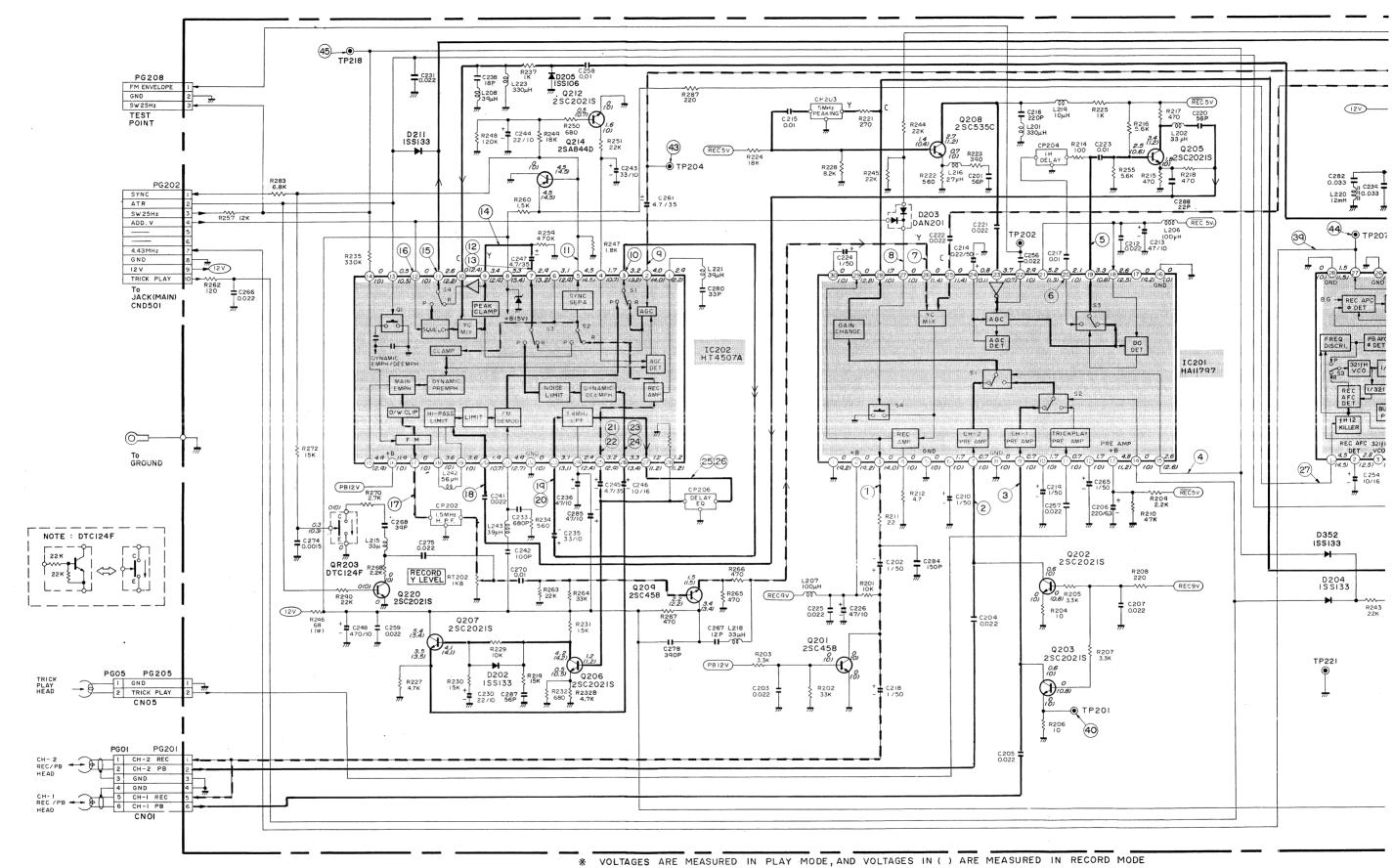
1-7

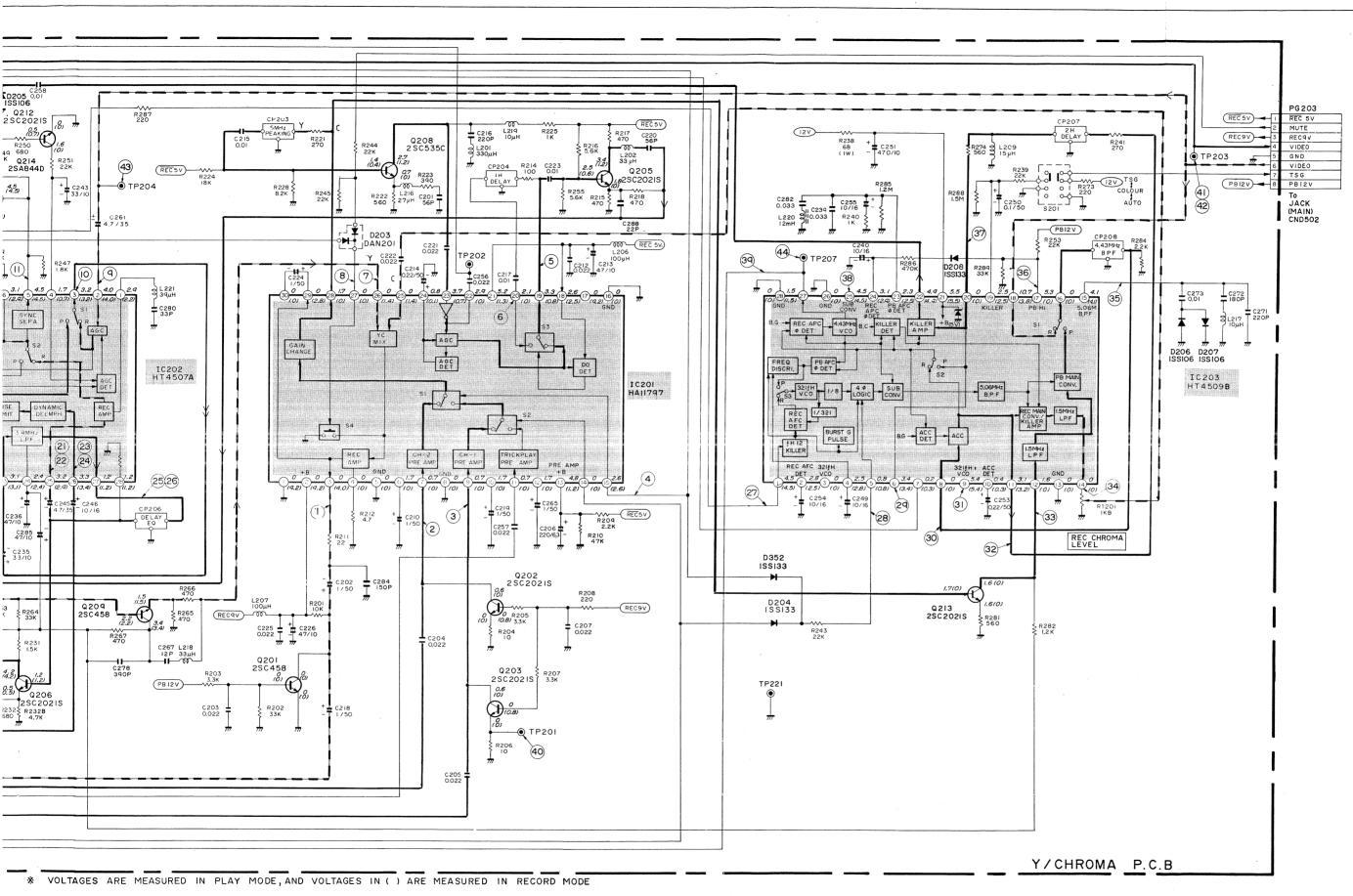
PG 706

| A5.6V | A17V | AC CLOCK | A GND (S) | FM DET |
| To | SERVO (MAIN) | PG605 | VIA CN605 |

(TYPE 4492) 1/2.

Y-CHROMA WYC FOR UK (BS) TYPE 4492 8004576





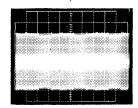
Bang&Olufsen

Y/CHROMA CIRCUIT WAVEFORM (TYPE 4492)

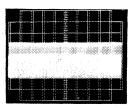
[IC201]

[IC202]

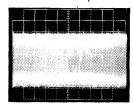
① PIN 3 REC 1V/20μs. div.



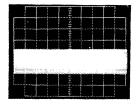
6PIN 20 PB 50mV/0.1ms. div.



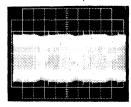
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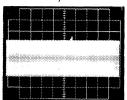
PIN26 REC 50mV/0.5ms. div.



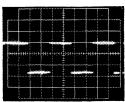
 $3^{\text{PIN 9 REC}}_{50\text{mV}/20\mu\text{s. div.}}$



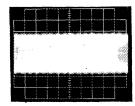
8 PIN 27 REC 1V/20μs. div.



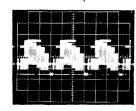
PIN15 REC 2V/10ms. div.



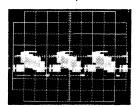
5PIN19 PB 0.1V/0.1ms. div.



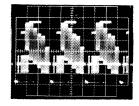
9 PIN2 REC 0.2V/20μs. div.



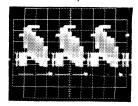
14 PIN9 REC 0.1V/20μs. div.



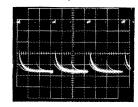
 $10^{\rm PIN3}$ REC 50mV/20 μ s. div.



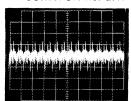
15 PIN11 REC/PB 0.2V/20μs. div.



 $11^{\text{PIN5}}_{\text{1V/20}\mu\text{s. div.}}$



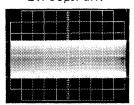
16 PIN12 REC/PB 50mV/0.1ms. div.



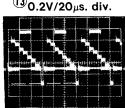
 $10^{\rm PIN7} \, {\rm REC} \ 0.1 {\rm V}/20 \mu {\rm s. \ div.}$



^{PIN 17} REC 2V/50μs. div.



 $13^{\rm PIN7~PB}_{\rm 0.2V/20\mu s.~div.}$

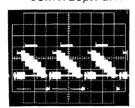


18 PIN 20 PB 0.1V/0.1ms. div.

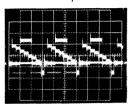


[IC202]

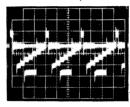
 $^{\mbox{\footnotesize{19}}} \mbox{\footnotesize{PIN23}} \mbox{\footnotesize{REC}} \mbox{\footnotesize{50mV/20}$$$${\mu s. div.}}$



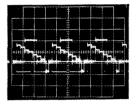
24 PIN 26 PB 0.1V/20μs. div.



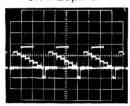
2 PIN 23 PB 50 mV/20 μs. div.



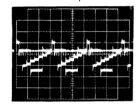
 $25^{\rm PIN\,27~REC}_{\rm 0.1V/20\mu s.~div.}$



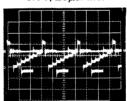
②1 PIN 25 REC $0.1V/20\mu s. \ div.$



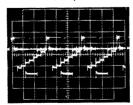
26 PIN 27 PB 0.1V/20μs. div.



PIN25 PB 0.1V/20μs. div.

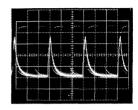


② PIN26 REC 0.1V/20μs. div.

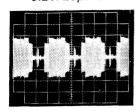


[IC203]

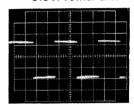
② PIN1 REC/PB 1V/20μs. div.



32 PIN11 REC 0.2V/20μs. div.



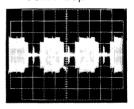
28 PIN5 REC/PB 0.5V/10ms. div.



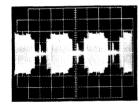
33 PIN12 PB 50mV/0.1ms. div.



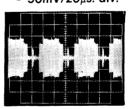
29 PIN6 REC/PB 50mV/20μs. div.



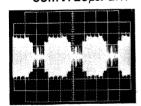
34 PIN14 REC 50mV/20μs. div.



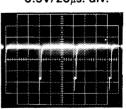
³⁰ PIN8 REC 50mV/20μs. div.



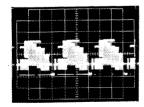
35 PIN15 REC/PB 50mV/20μs. div.



③1 PIN9 REC/PB 0.5V/20μs. div.

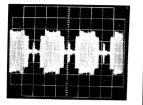


36 PIN17 REC 0.2V/20μs. div.

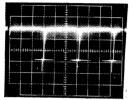


[IC203]

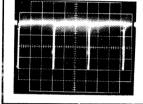
 $\mathfrak{J}^{\mathsf{PIN2O}}$ REC/PB 50mV/20 μ s. div.



38 PIN25 REC 0.1V/0.5ms. div.

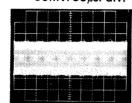


39 PIN 27 REC 0.1V/0.2ms. div.

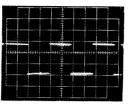


[TEST POINT]

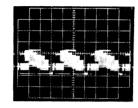
Φ TP201 REC 50mV/50μs. div.

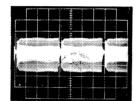


45 TP218 REC/PB 2V/10ms. div.

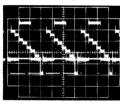


 $\textcircled{1} \begin{tabular}{l} TP 203 & REC \\ 0.5 V/20 \mu s. & div. \end{tabular}$

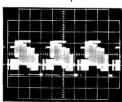




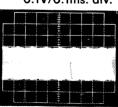
Φ TP203 PB 0.2V/20μs. div.



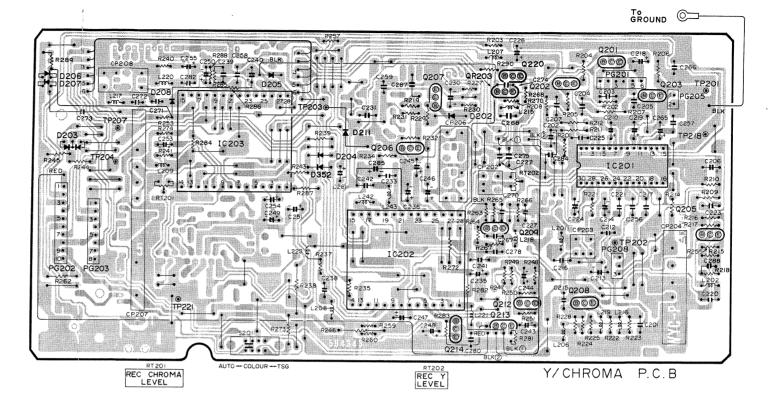
 $\textcircled{3}^{\text{TP2O4}}_{\text{0.2V/20}\mu\text{s. div.}}$



TP207 REC/PB 0.1V/0.1ms. div.



Y-CHROMA PCB

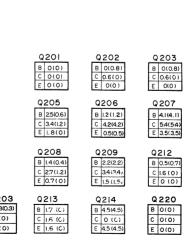


						10	201							
i	2	3	4	5	6	7	8	9	10	11	12	13	14	1.5
0(9.2)	0 (9.2)	0 (4.0)	0(0)	0(0)	1.7(0)	0.7(0)	0(0)	0.7(0)	1.7(0)	0.7(0)	1.7(0)	4.8 (1.2)	0(0)	26(26)
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
0(0)	0 (2.8)	1.7(0)	0(0)	0(1.4)	0(1.4)	0.8(0.1)	3.7(0.7)	2.9(0)	5.2(1.3)	2.1(0)	3.3(0.8)	2.6(25)	0(9.2)	0(0)

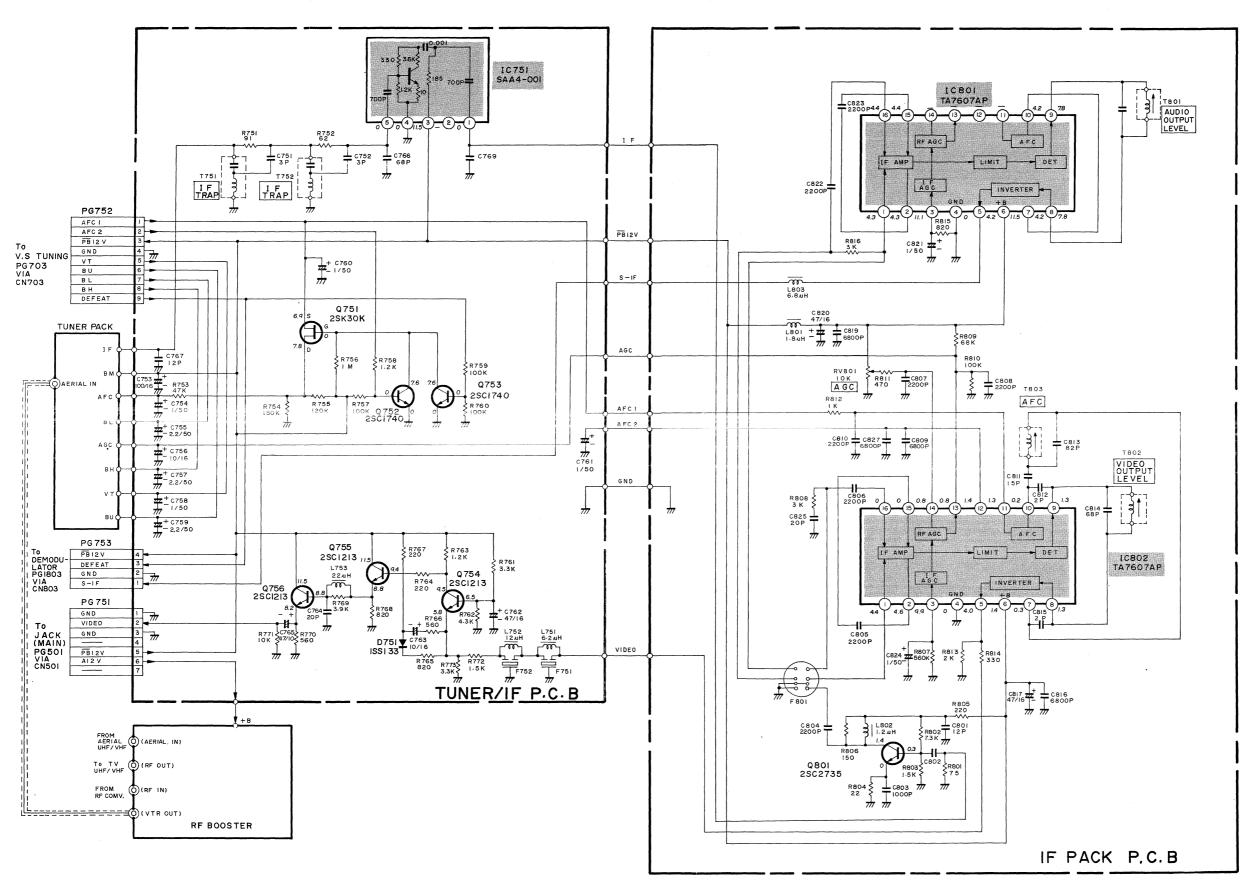
	IC 202												
15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.9(2.9)	(0) P.11	0(0)	3.6 (0)	3.6(0)	1.9(0.7)	4.9(2.7)	0(0)	3.1(3.1)	24(2.4	3.2(2.9)	3.3(3.4)	1.2(1.2)	1.2 (1.2)
14	13	12	11	10	9	8	7	6	5	4	3	2	,
0(0)	0.5(0.5)	0(0)	2.6(2.2)	0(2.4)	3.4(2.9)	5.3(5.4)	29(3.2)	3.1(2.9)	4.5(4.5)	1.7(0.7)	32 (3.2)	4.0(4.0)	29(22)

	I,C 203												
15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.1(4.1)	0(0)	5.3(0)	10.7(3,8)	2.5(2.5)	0(0)	5.5(5.5)	4.9(4.9)	2.3(2.5)	3.1(2.9)	4.5(4.5)	0(0)	1.5(1.5)	0(0)
14	13	12	11	10	9	8	7	6	. 5	4	3	2	- 1
0(0)	0(0)	1.6(0)	3.1(3.2)	0.4(0.3)	5.4(5.4)	0(0)	0,2(0,3)	3.4(3.4)	0.8(0.8)	2.5(28)	0(0)	28(25)	45(45)

PG201	PG202
I CH-2 REC	1 SYNC
2 CH-2 PB	2 ATR
3 GND	3 SW25Hz
4 GND	4 ADD. V
5 CH-I REC	5 —
6 CH-I PB	6 —
To	7 4.43MHz
VIDEO HEAD	8 GND
PGOI	9 12V
VIA CNOI	IO TRICK PLAY
PG 2 O 3 i REC 5 V 2 MUTE 3 REC 9 V	To JACK (MAIN) CND501
4 VIDEO	PG 205
5 GND	I GND
6 VIDEO	2 TRICK PLAY
7 TSG	То
To JACK (MAIN) CND 502	VIDEO HEAD PGO5 VIA CNO5
PG 208 I FM ENVELOPE 2 GND 3 SW25Hz TEST POINT	

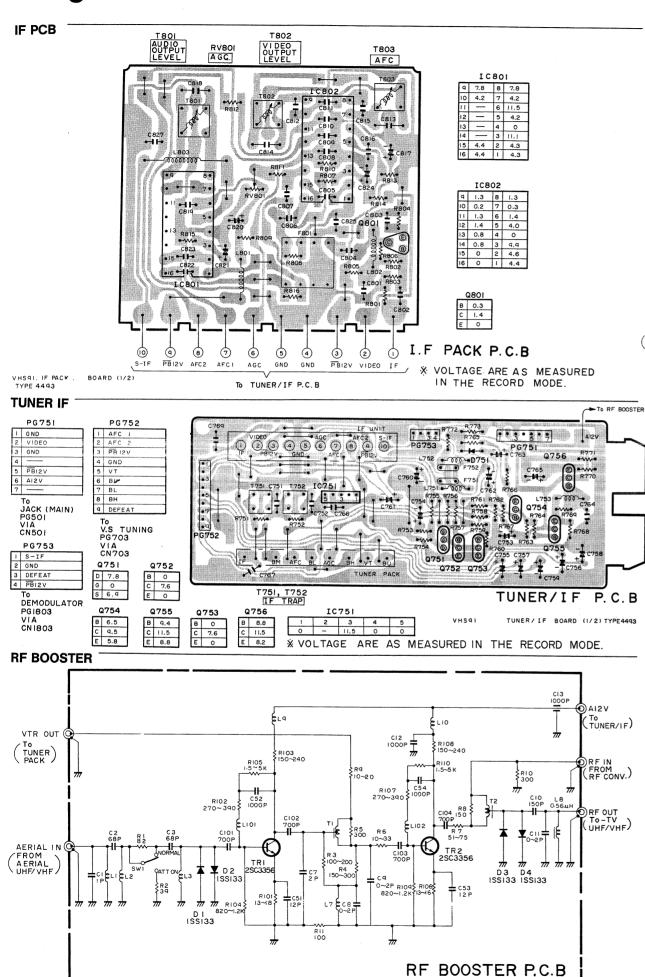


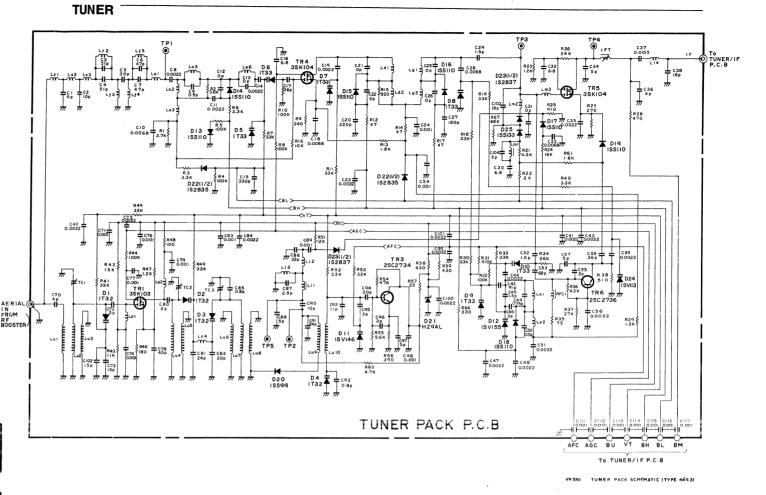
* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN() ARE MEASURED IN RECORD MODE.



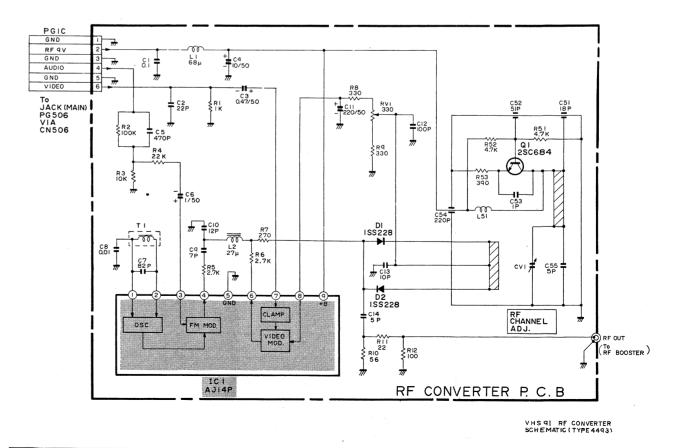
The Tuner IF Block 8004595 is a single unit, and consists of VHF/UHF Tuner, IF and RF Booster. With failure in this blok we recommend replacing.

* VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

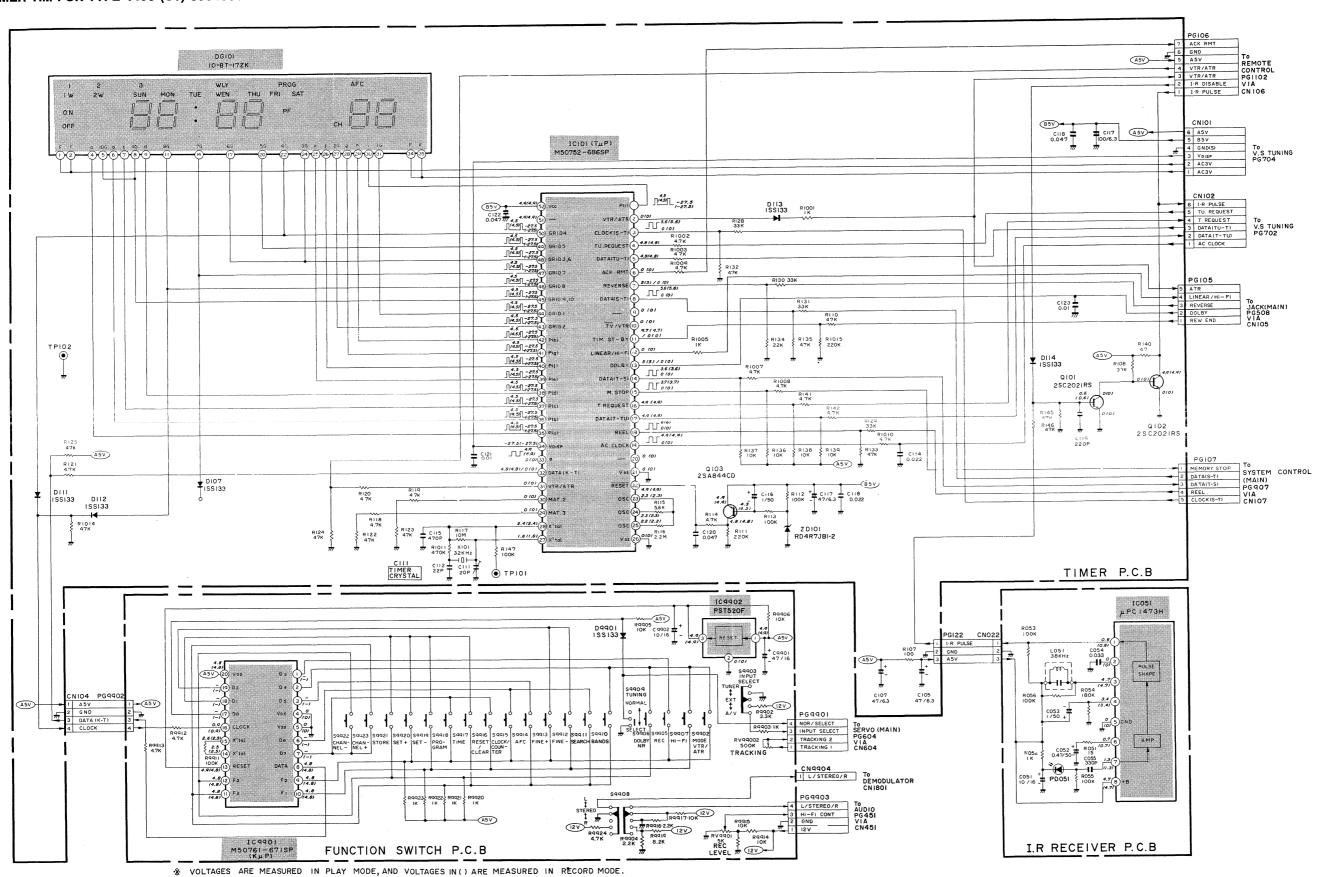




RF CONVERTER FOR TYPE 4493 (CT) 8004542

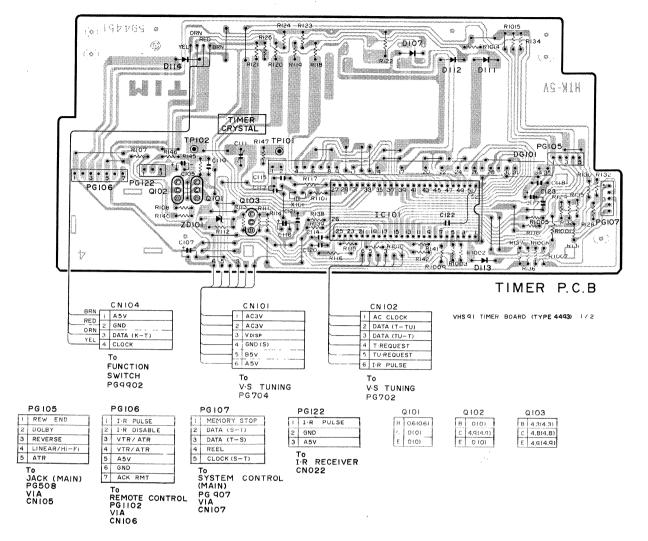


TIMER TIM FOR TYPE 4493 (CT) 8004586



Bang&Olufsen

TIMER PCB

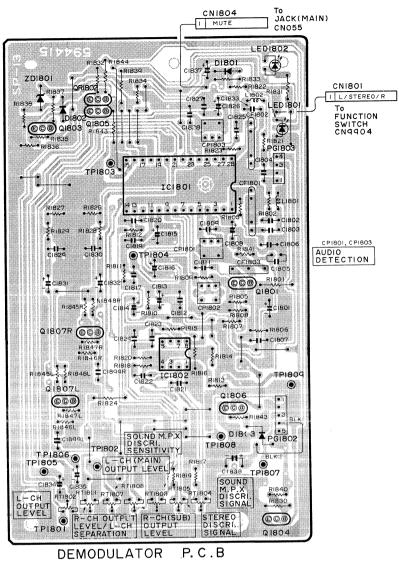


5.2	61	6.0	40		451							·								
J.,	51	50	44	48	47	4t	45	44	43	42	41	40	39	.18	37	36	35	3.4	33	32
4.9 (4.9)	4.9(4.9)	- (-)	- (-)	- (-)	- (-)	- (-)				 		-	 				- 55	07	0.0	L 02
			<u> </u>	(-)	- (-)	- (-)	-(-)	- (-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-275(-275)	- (-)	I - (-)
1 1	2	3	4	5	6	7	8	a	10		12	1.2	10	1.0	1.0					
	0(0)							ļ		- ' '	14	13	14	110	16	177	18	19	20	1 21
-(-)	0101	-(-)	48(4.8)	4.8(4.8)	0(0)	-(-)	-(-)	0(0)	0 (0)	-(-)	0(0)	- (-)	-1-1	- (-)	4.9(4.9)	4,9(4,9)				
											0.07	1 ' '	- ()	- ()	4.4(4,4)	4.4(4,4)	-(-)	-(-)	0(0)	0(0)

31	30	29	28	27
0(0)	0 (0)	0(0)	2.4(2.4)	1.6(1.6)
22	23	24	25	26
4.9 (4.9)	2.3(2.3)	2.3(2.3)	2.2 (2.2)	0(0)

* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN() ARE MEASURED IN RECORD MODE

DEMODULATOR PCB



DEMODULATOR

101801

15	16	17	18	19	20	21	22	23	24	25	26	27	28
0 (10.2)	0 (18.7)	0 (7.2)	0 (0)	0 (6.9)	0 (7.0)	0.2(2.2)	0.2(2.2)	0(10.8)	0 (2.9)	0 (2.9)	0.3(6.7)	0(1.8)	0(1.8)
14	13	12	11	10	q	8	7	6	5	4	3	2	1
0(0)	0(5.7)	0 (6.3)	0 (5.4)	0(6.3)	0(1.4)	0 (5.0)	0(10.8)	0 (1.4)	0 (2.8)	0(2.8)	0.3(6.1)	0(1.7)	0(1.7)

IC1802 5 6 7 8 0 (2.5) 0.2(2.5) 0 (2.5) 0 (10.8)

B 0 (0) C 0 (i0,4) E 0 (0)

* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN() ARE MEASURED IN RECORD MODE.

0(0)	0 (2.5)	0.3(2.5)	0.4(2
0.0100		QIE	
QRISC	2	QIIC	100

B 0(0) C 0(0) E 0(0)

G	11803	Q	1804
В	0(7.2)	В	0 (0.6)
С	0(0)	С	0(0)
Ε	0 (5.5)	Ε	0(0)

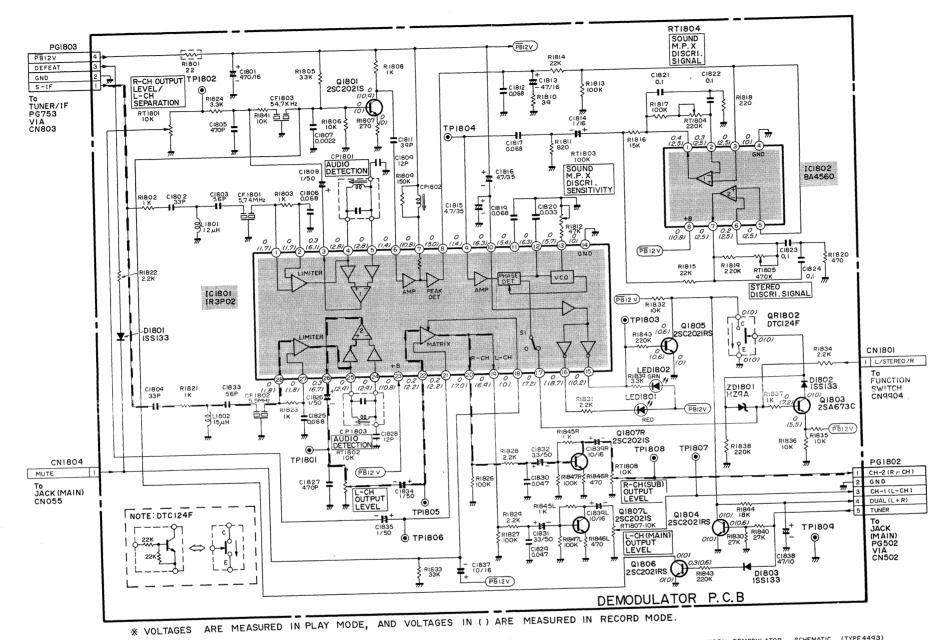
G	1805	Q	1806
1	0(0.6)	В	0.3(0.6
;	0(0.6)	С	0(0)
=	0(0)	F	0(0)

	PG1802
Ī	CH-2 (R)
2	GND
3	CH-1 (L)
4	DUAL (L+R)
5	TUNER

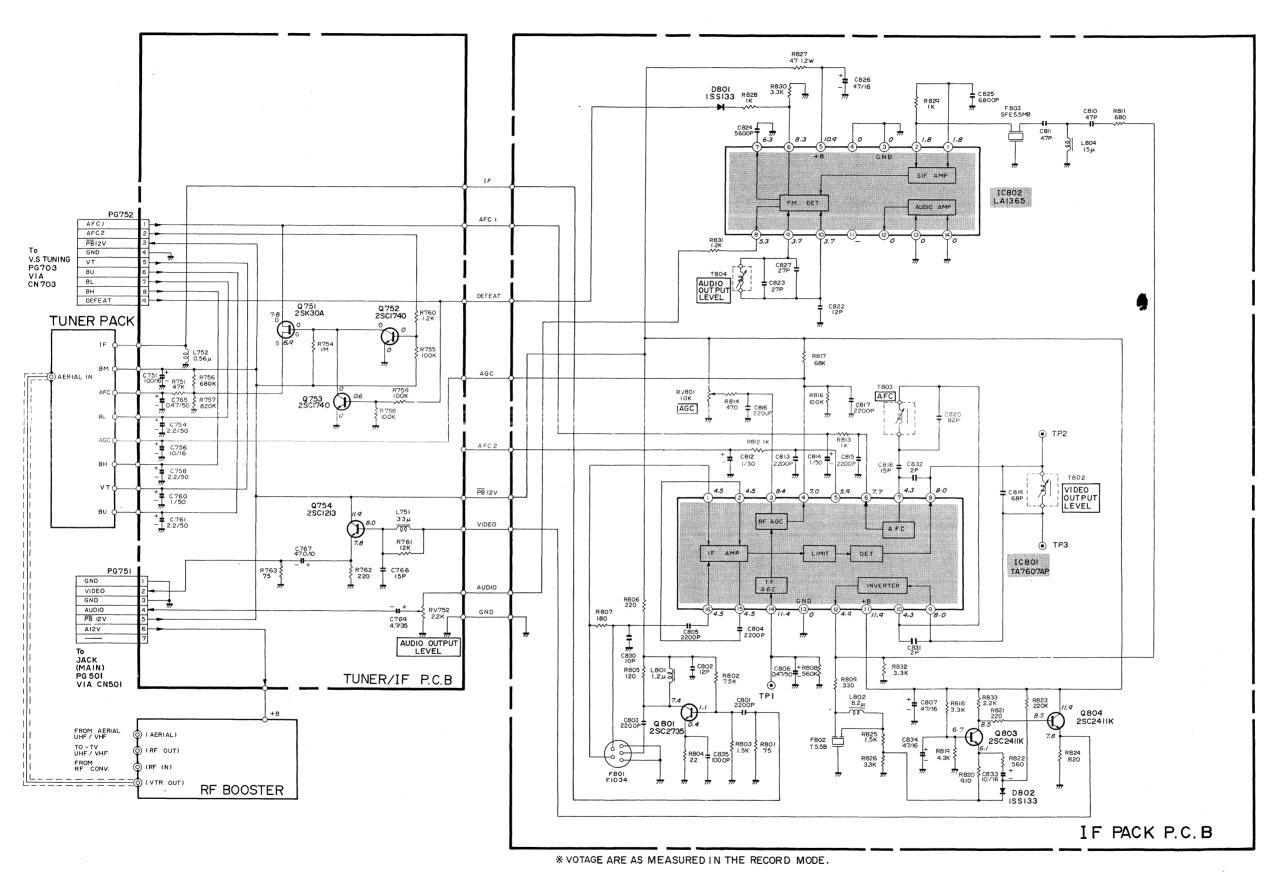
To JACK (MAIN) PG502 VIA CN502

	PG1803									
4	PB12V									
3	DEFEAT									
2	GND									
Γ.	C_TE									

To TUNER / IF PG753 VIA CN803



VHS91 DEMODULATOR SCHEMATIC (TYPE 4493)



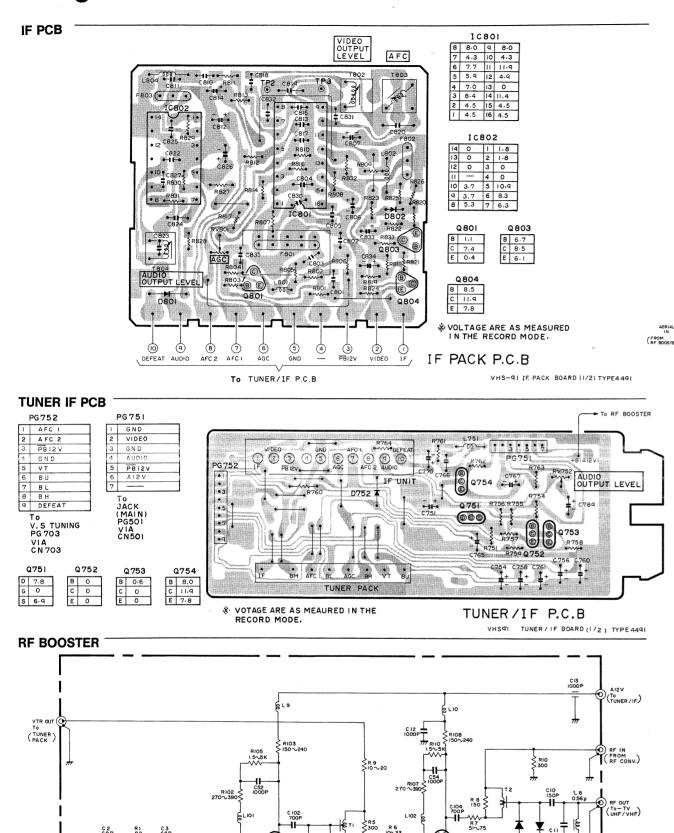
The Tuner IF Block 8004540 is a single unit and consists of VHF/UHF Tuner, IF and RF Booster. With failure in this block we recommend replacing.

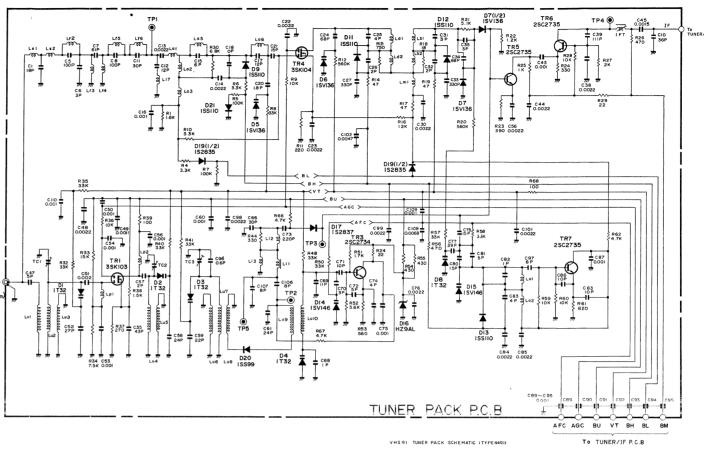
VHS QI TUNER/IF SCHEMATIC (TYPE 44QI)

D3 D4 ISSI33 ISSI33

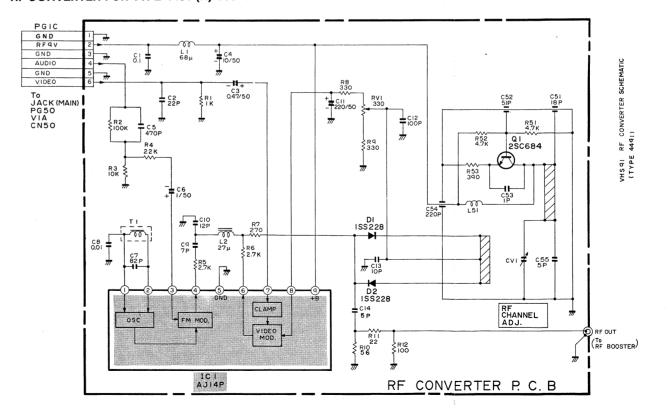
RF BOOSTER P.C.B

TUNER



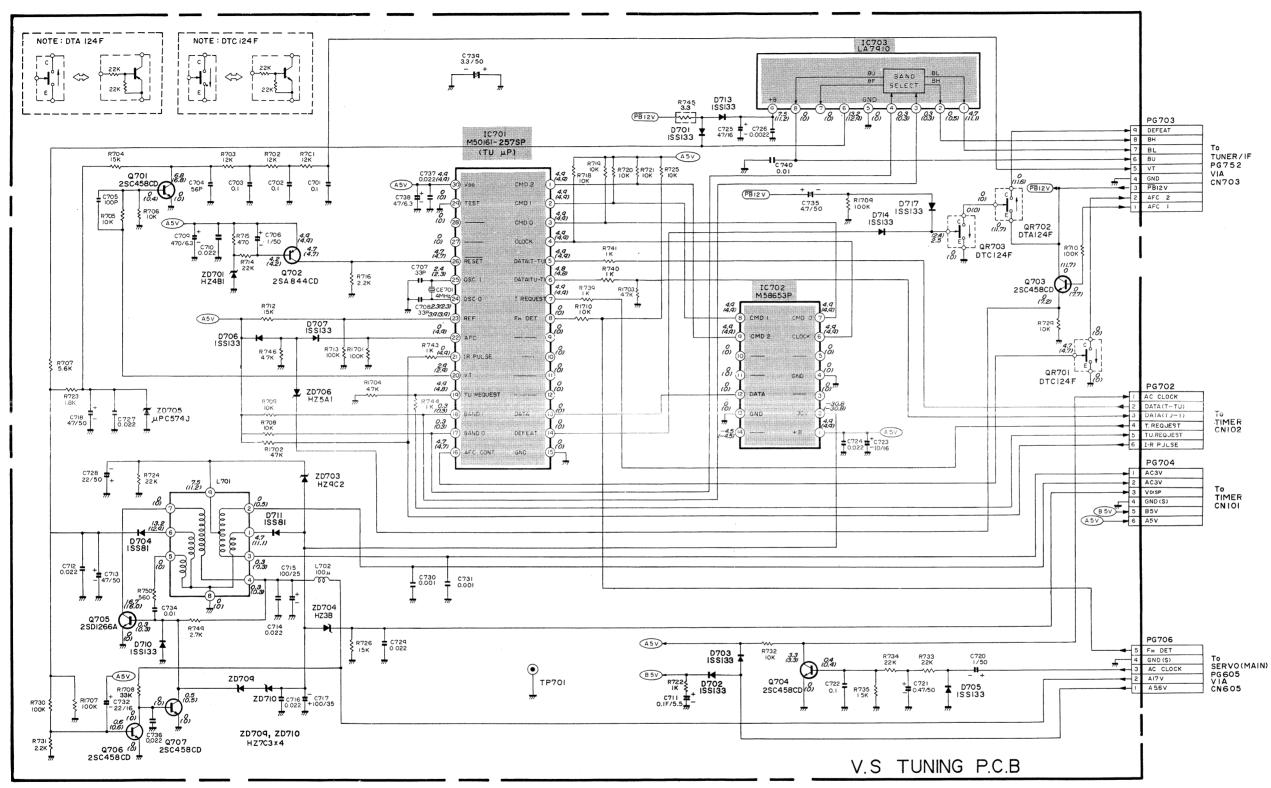


RF CONVERTER FOR TYPE 4491 (H) 8004542



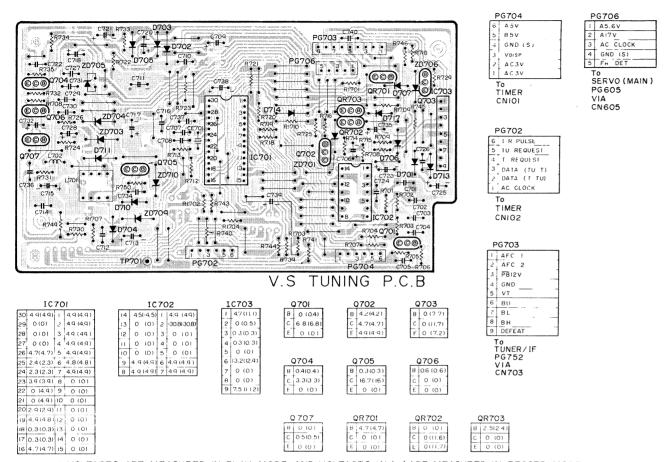
RF Converter 8004542 is a single unit. With failure in this unit we recommend replaining.

VS TUNING FOR TYPE 4491 (H) AND TYPE 4493 (CT) 8004588



* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN() ARE MEASURED IN RECORD MODE.

VS TUNING PCB



* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.

VHSQI V.S TUNING BOARD (TYPE 4491,4493) 1/2

1-21 1-21

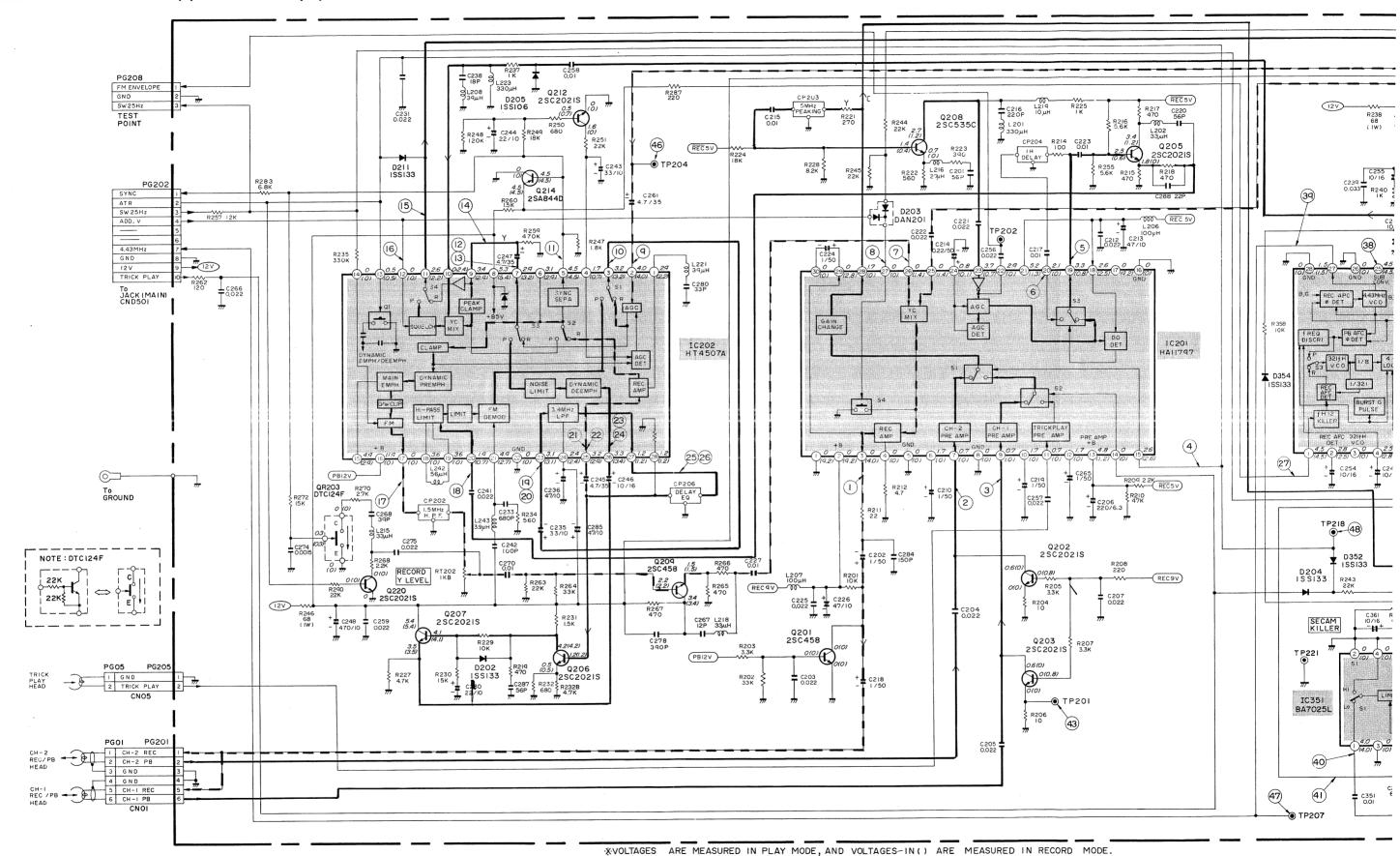
1-21 1-21

PG706

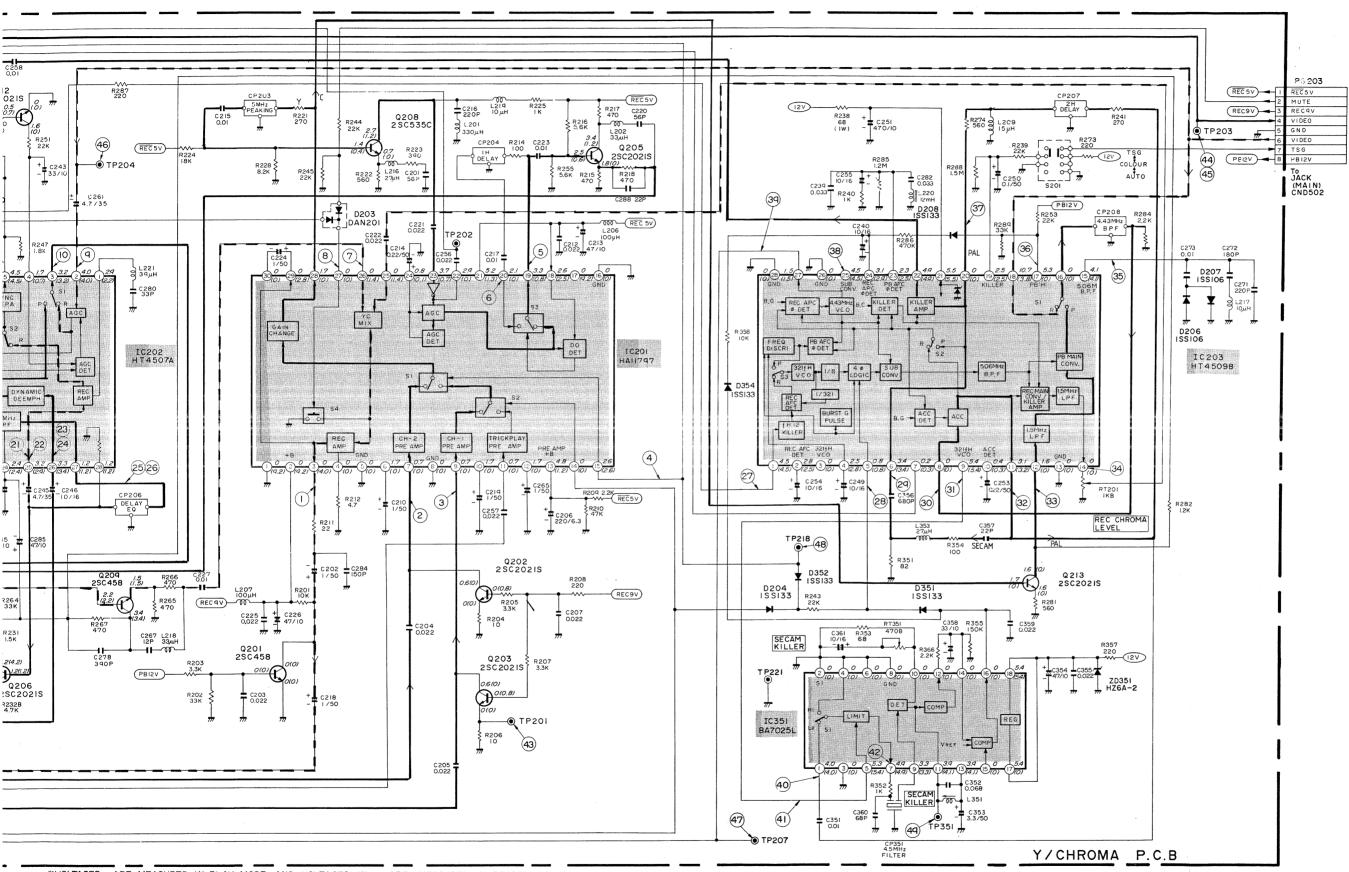
| A5.6V |
| A5.6V |
| A5.6V |
| A5.6V |
| A6.0V |

BOARD (TYPE 4491,4493) 1/2

Y-CHROMA WYC FOR TYPE 4491 (H) AND TYPE 4493 (CT) 8004577



22



Y/CHROMA CIRCUIT WAVEFORM (TYPE 4491, 4493)

[IC201]

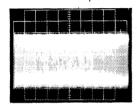
① PIN 3 REC $1V/20\mu s. \ div.$



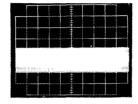
6PIN 20 PB 50mV/0.1ms. div.



 $\label{eq:pin7} \ensuremath{\text{2PIN7}} \ensuremath{\text{REC}} \\ \ensuremath{\text{50mV/20}\mu\text{s. div.}}$



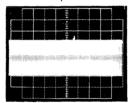
PIN 26 REC 50mV/0.5ms. div.



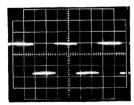
 $3^{\text{PIN 9 REC}}_{50\text{mV}/20\mu\text{s. div.}}$



8 PIN 27 REC 1V/20μs. div.



PIN15 REC 2V/10ms. div.

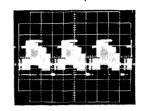


5PIN19 PB 0.1V/0.1ms. div.

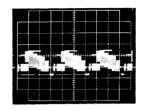


9 PIN2 REC 0.2V/20μs. div.

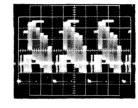
[IC202]



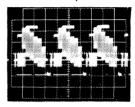
14 PIN9 REC 0.1V/20μs. div.



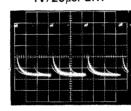
 $10^{\rm PIN3}$ REC 50mV/20 μ s. div.



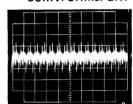
15 PIN 11 REC/PB 0.2V/20μs. div.



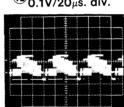
 $11^{\text{PIN 5 REC/PB}}_{1\text{V}/20\mu\text{s. div.}}$



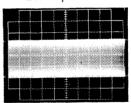
16 PIN 12 REC/PB 50mV/0.1ms. div.



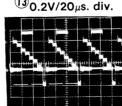
12 PIN7 REC 0.1V/20μs. div.



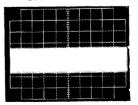
^{PIN 17} REC 2V/50μs. div.



¹³0.2V/20μs. div.

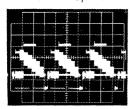


18 PIN 20 PB 0.1 V/0.1 ms. div.

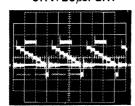


[IC202]

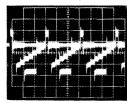
9 PIN 23 REC 50mV/20 μ s. div.



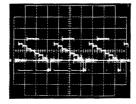
24 PIN 26 PB 0.1V/20μs. div.



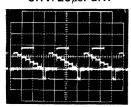
 $20^{\rm PIN}\,23^{\rm PB}$ 50mV/20 μ s. div.



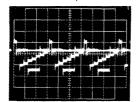
²⁵ PIN 27 REC 0.1V/20μs. div.



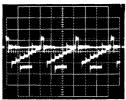
②1 PIN 25 REC $0.1V/20\mu s. \ div.$



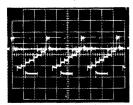
 $26 \frac{\text{PIN 27 PB}}{0.1 \text{V}/20 \mu \text{s. div.}}$



② PIN25 PB 0.1V/20μs. div.

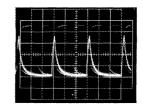


② PIN26 REC 0.1V/20μs. div.

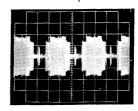


[IC203]

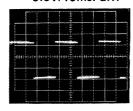
 $\cancel{20}^{\mathrm{PIN1}}_{\mathrm{1V/20}\mu\mathrm{s.}}$ div.



32 PIN11 REC 0.2V/20μs. div.



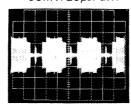
28 PIN5 REC/PB 0.5V/10ms. div.



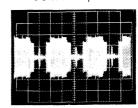
33 PIN12 PB 50mV/0.1ms. div.



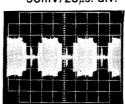
 $^{29}_{50\text{mV}/20\mu\text{s. div.}}$



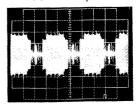
34 PIN14 REC 50mV/20μs. div.



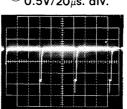
 30°_{\circ} PIN8 REC 50mV/20 μ s. div.



 $35^{\mathrm{PIN}15}$ REC/PB 50mV/20 μ s. div.



31 PIN9 REC/PB 0.5V/20μs. div.

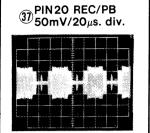


36 PIN17 REC 0.2V/2Oμs. div.

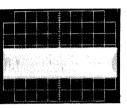


Y-CHROMA PCB





38 PIN 25 REC 0.1V/0.5ms. div.



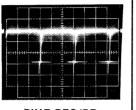
39 PIN27 REC 0.1V/0.2ms. div.



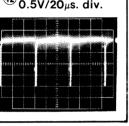
[IC351]

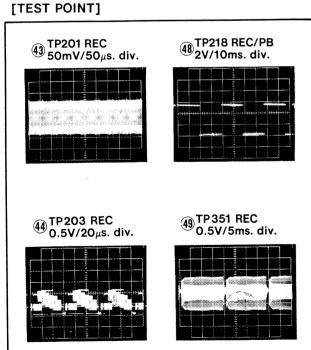


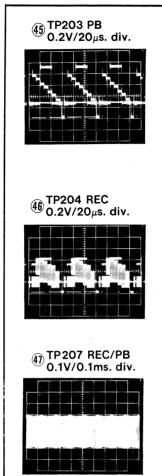
41 PIN5 REC/PB $0.5V/20\mu s. div.$

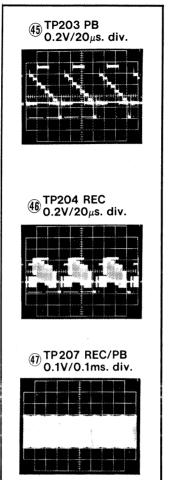


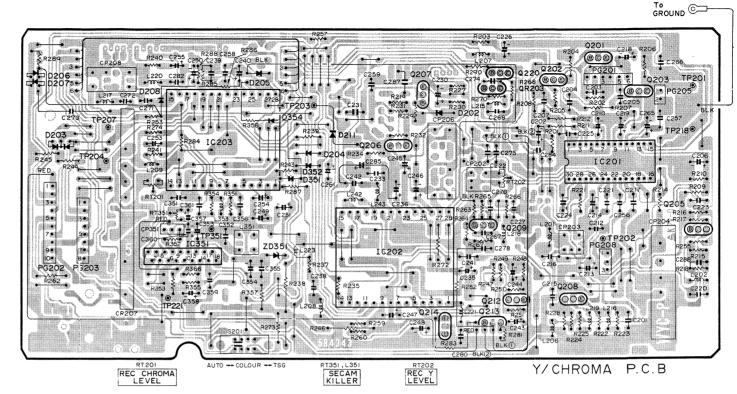
PIN7 REC/PB 0.5V/20μs. div.







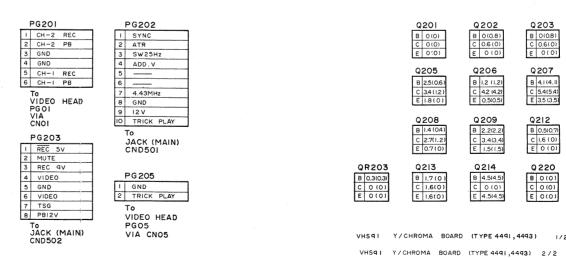




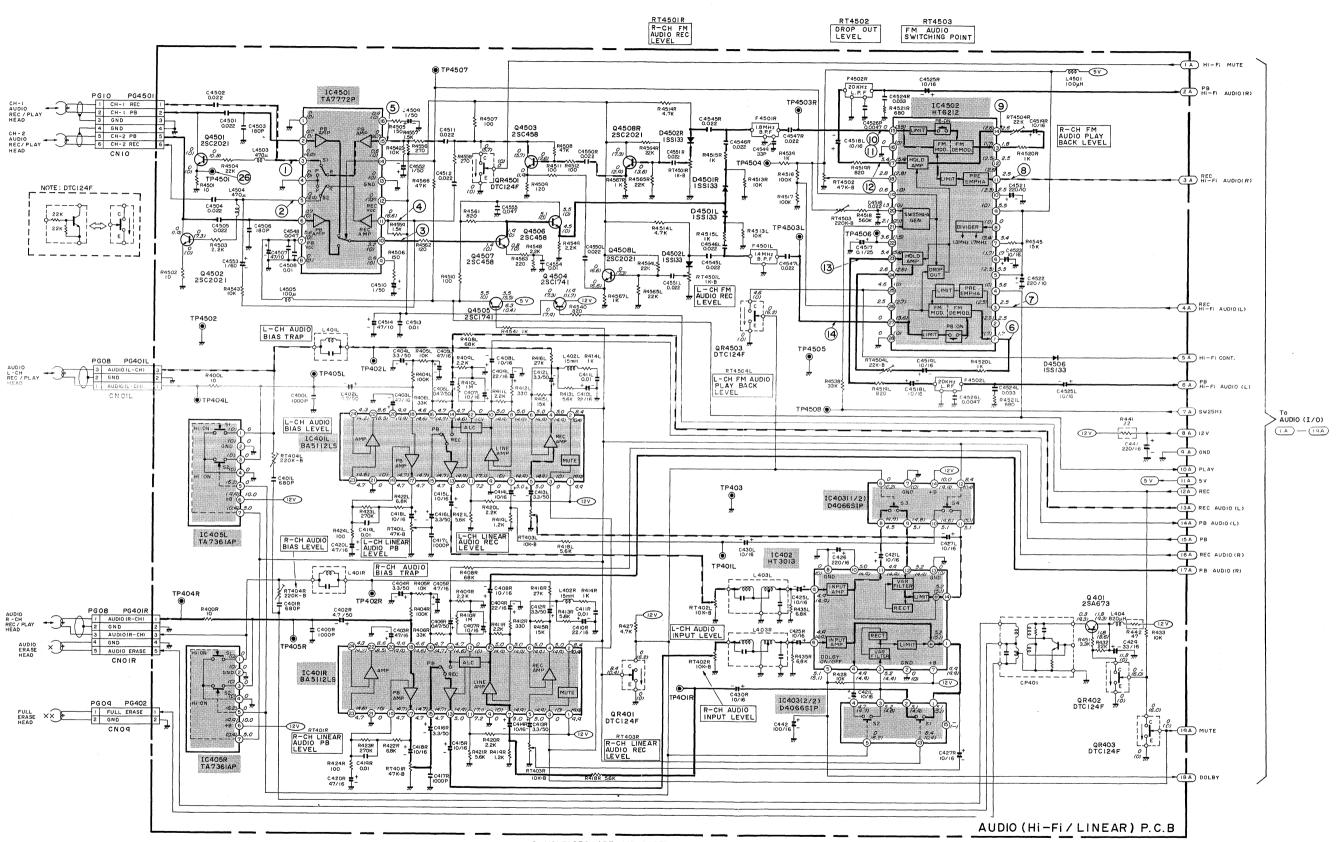
						IC	201														ICZ	202						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	23	24	25	26	27	28
0(9.	2) 0(4.2)	0(4.0)	0 (0)	0(0)	1.7(0)	0.7(0)	0 (0)	0.7(0)	1.7(0)	0.7(0)	1.7(0)	4.8(1.2)	0(0)	2.6 (2.6)	4.912.9	(0) P.11	0(0)	3.6(0)	3 6(0)	1.9(0.7)	4.9(2.7)	0(0)	3.1(31)	2.4(2.4)	3.2(2.9)	3.3(3,4)	1.2(1.2)	1.2(1.2)
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	14	13	12	11	10	9	8	7	6	5	4	3	2	
010	0 (2.8)	1.7(0)	0(0)	0(1,4)	0(1.4)	0.8(0.1)	37(0.7)	2.9(0)	5.2(1.3)	21(0)	3,3(0.8)	2.6 (2.5)	0(9.2	0(0)	0(0)	0.5 (0.5)	0(0)	2.6 (2.2)	0(2,4)	3,4 (2.9)	53(5.4)	29(3.2	3.1(2.9)	4.5 (4.5)	1.7 (0.7)	3.2(3.2)	4.0 (4.0)	2.9 (2.2)
																		-										

						IC	203										IC	351				
15	16	17	18	19	20	21	22	23	24	25	26	27	28	1	3	5	7	9	11	.13	15	17
4.1 (4.1)	0 (0)	5,3(0)	10.7(3.8)	25(25)	0(0)	5.5(5.5)	4.9 (4.9)	2.3 (2.5)	3.1 (2.9)	4.5(4.5)	0 (0)	1.5(1.5)	0 (0)	4.0(4.0)	0(0)	5.3(5.4)	49(4.9)	3.3(3.3)	3.9(4.1)	3.9 (4.1)	0(0)	5.4 (0)
14	13	12	11	10	9	8	7	6	5	4	3	2	1	2	4	6	8	10	12	14	16	18
0(0)	0(0)	1.6(0)	3.1(3.2)	0.4(0.3)	5.4(5.4)	0(0)	0.2(0.3)	3.4(3.4)	0.8(0,8)	2.5 (2.8)	0(0)	28 (25)	4.5(4.5)	0(0)	0(0)	0(0)	0 (0)	0(0)	0 (0)	0(0)	0 (0)	5.4(5.4

* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.



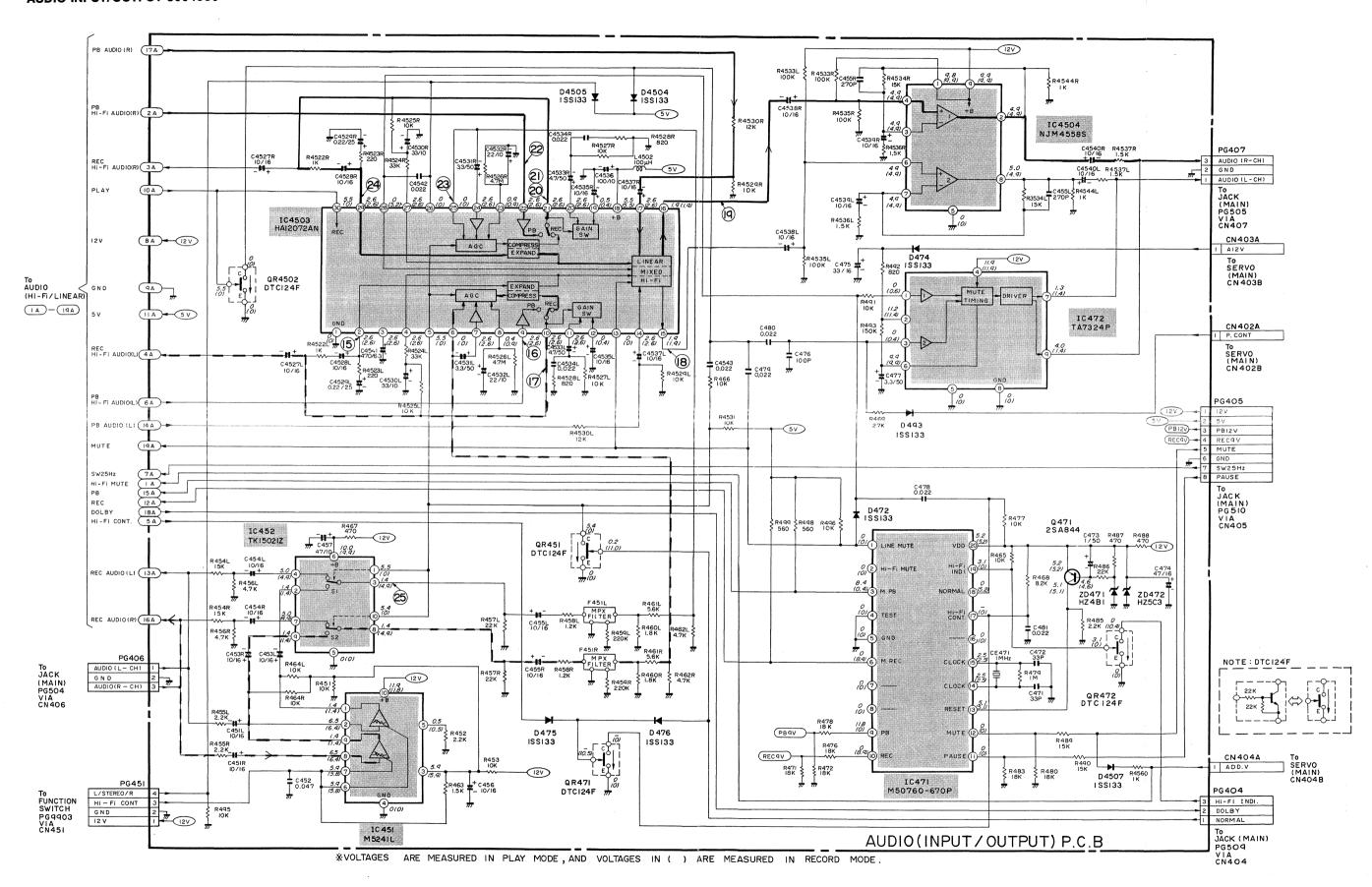
		PG 208							
- [-	FM ENVELOPE							
	2	GND '							
	3	SW25Hz							
TEST POINT									



* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE

Bang&Olufsen

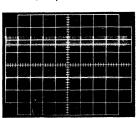
AUDIO INPUT/OUTPUT 8004580



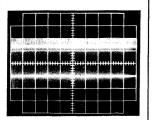
AUDIO CIRCUIT WEVEFORMS (1/2)

[IC4501]

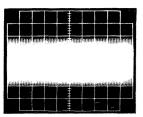
① PIN 3 REC IV/20 μ s. div.



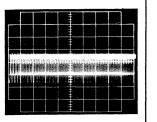
2 PIN 5 REC $IV/20\mu s. div.$



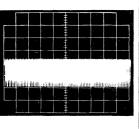
3 PIN 10 PB $0.2V/20\mu s. div.$



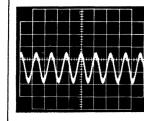
4 PIN 11 REC 50mV/10μs. div.



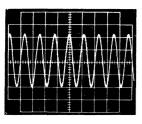
⑤ PIN 15 REC $50\text{mV}/10\mu\text{s. div.}$



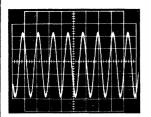
⑥ PIN 1 PB 50mV/2ms. div.



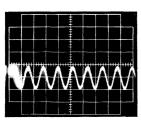
① PIN 3 REC 0.1 V/2 ms. div.



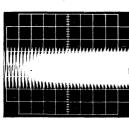
(8) PIN 11 REC 0.1 V/2ms. div.



9 PIN 14 PB 20mV/2ms. div.

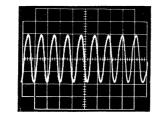


10 PIN 15 PB $0.1 V/2 \mu s. div.$

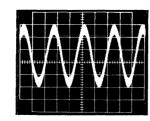


[IC4502]

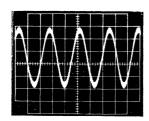
① PIN 15 REC $0.5V/0.5\mu s. div.$



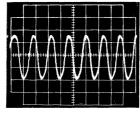
12 PIN 17 PB 0.1V/1ms. div.



(3) PIN 23 PB 0.1 V/1 ms. div.



(4) PIN 27 REC $0.2V/0.5\mu$ s. div.



[IC4503]

(5) PIN 2 PB 0.1 V/2 ms. div.

AUDIO CIRCUIT WAVEFORMS (2/2)

20 PIN 21 PB

21) PIN 21 REC

22 PIN 22 PB

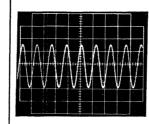
23 PIN 25 REC

5mV/2ms. div.

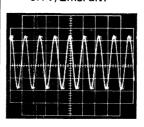
0.1V/2ms. div.

0.1 V/2 ms. div.

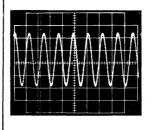
0.1 V/2ms. div.



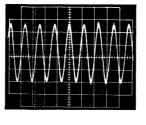
16 PIN 9 PB 0.1 V/2 ms. div.



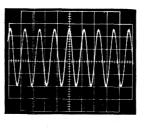
① PIN 10 PB 0.1V/2ms. div.



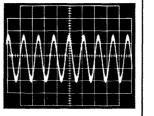
18 PIN 15 PB 20mV/2ms. div.



(9) PIN 16 PB 20mV/2ms. div.

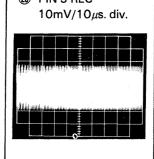


29 PIN 29 PB 5mV/2ms. div.



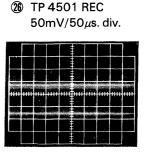
[IC452]

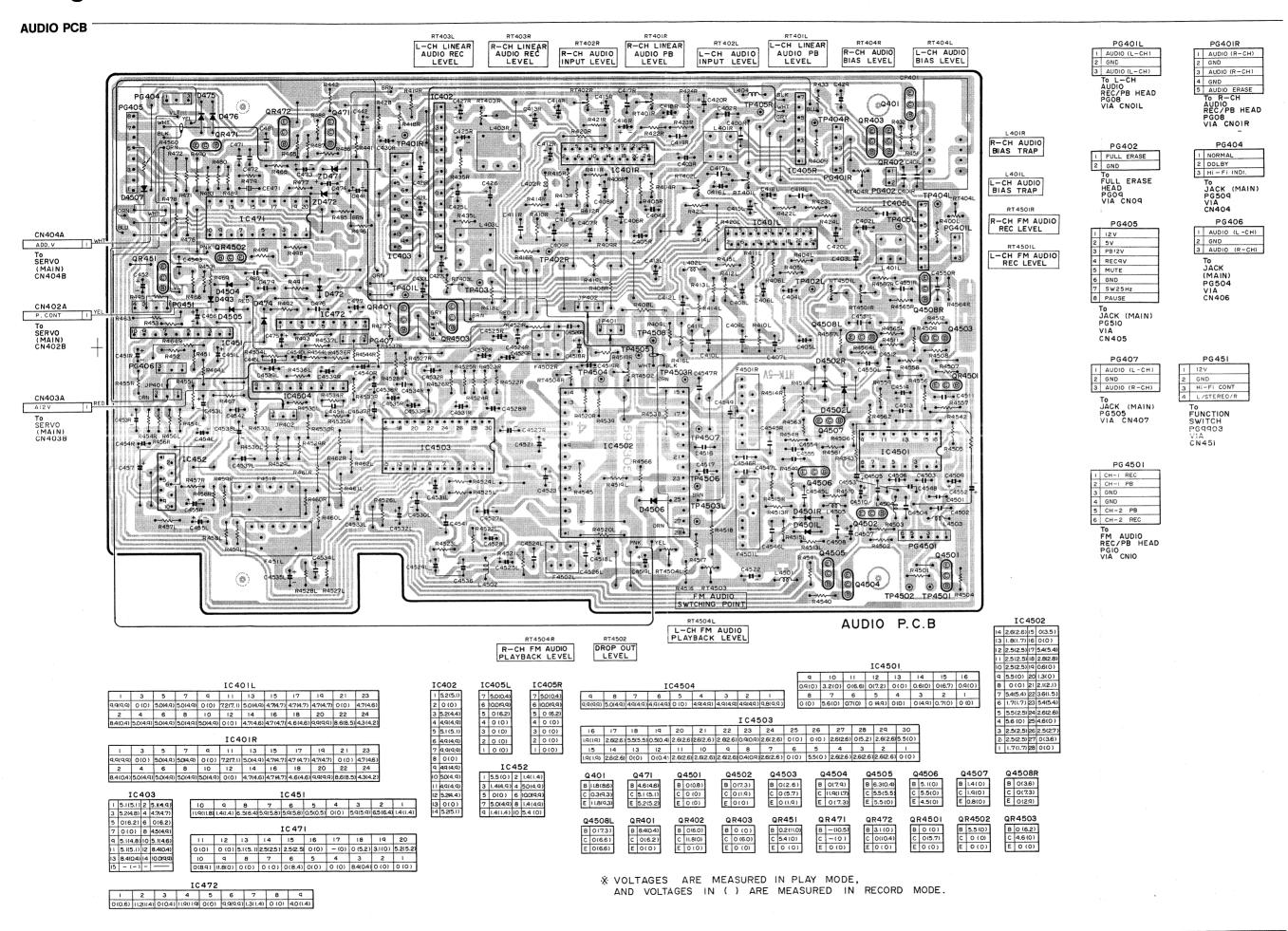
25 PIN 3 REC



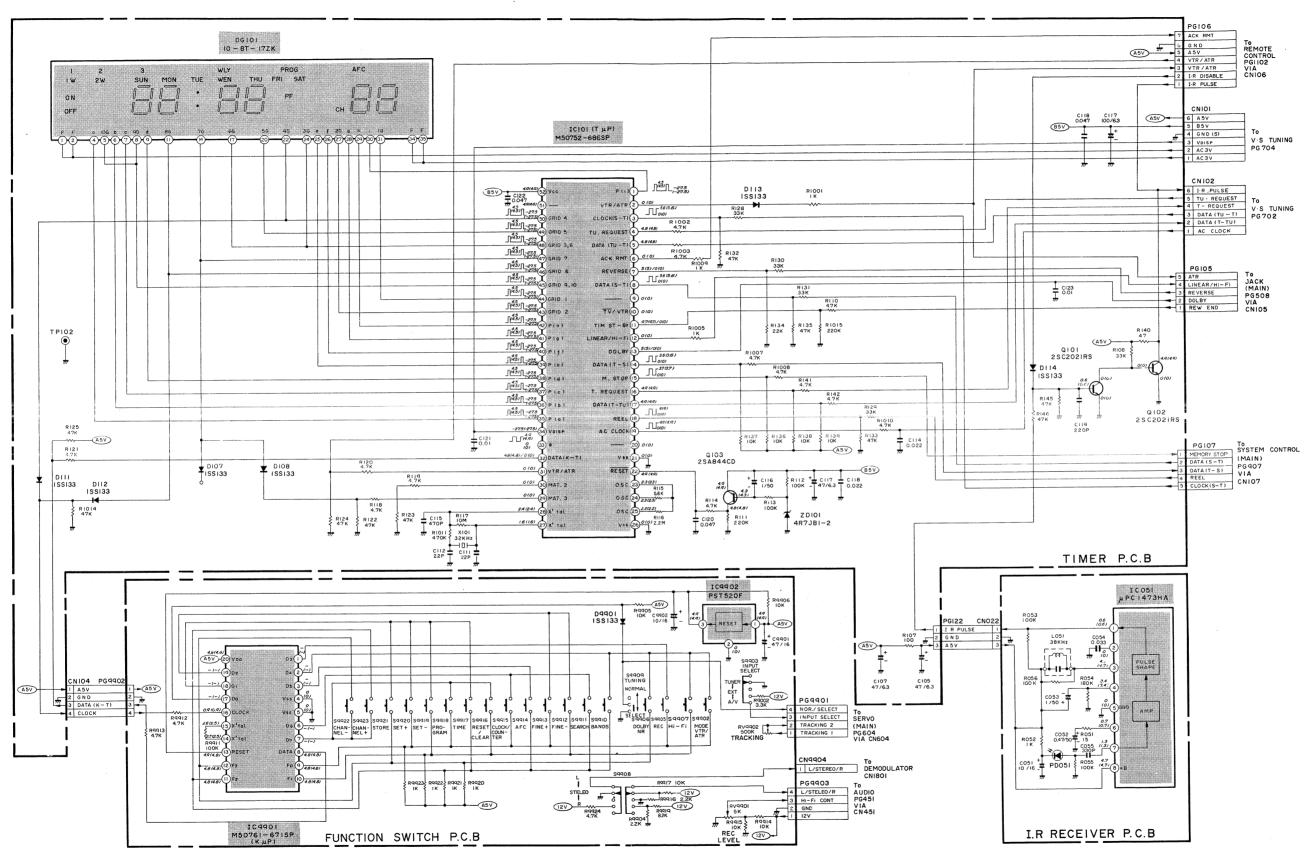
[TEST POINT]

26 TP 4501 REC



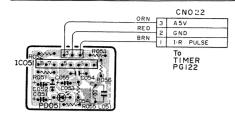


TIMER TIM FOR TYPE 4491 (H) AND TYPE 4492 (BS) 8004585 FUNCTION SWITCH 8004583 - INFRARED RECEIVER INF. 8004549



^{*} VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.

IR RECEIVER PCB



IR RECEIVER P.C.B

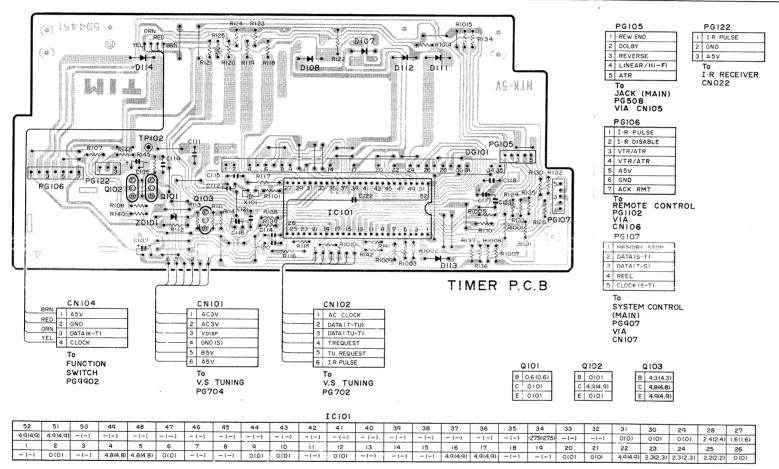
 8
 7
 6
 5
 4
 3
 2
 I

 4.7 (4.7)
 1.3 (1.3)
 0.7 (0.7)
 0 (0)
 3.4 (3.4)
 4.7 (4.7)
 0 (0)
 0.6 (0.6)

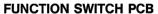
*VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN() ARE MEASURED IN RECORD MODE.

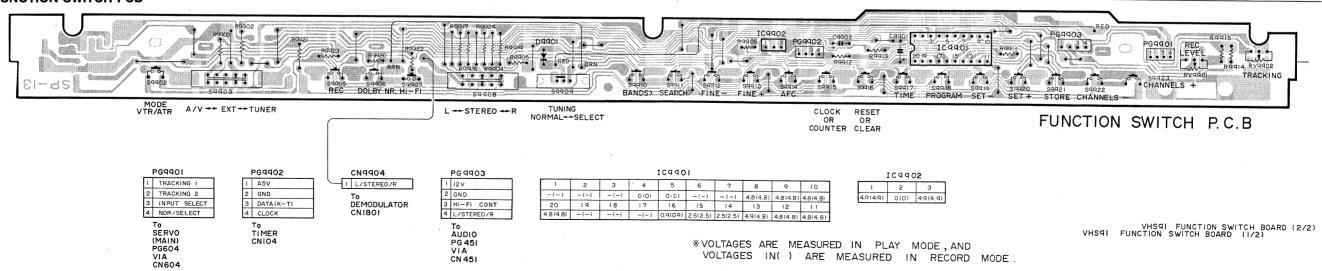
VHSQL IR RECEIVER BOARD (1/2)

TIMER PCB



*VOLTAGE ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE: VHS 41 TIMER BOARD (TYPE 4491, 4492) 1/2

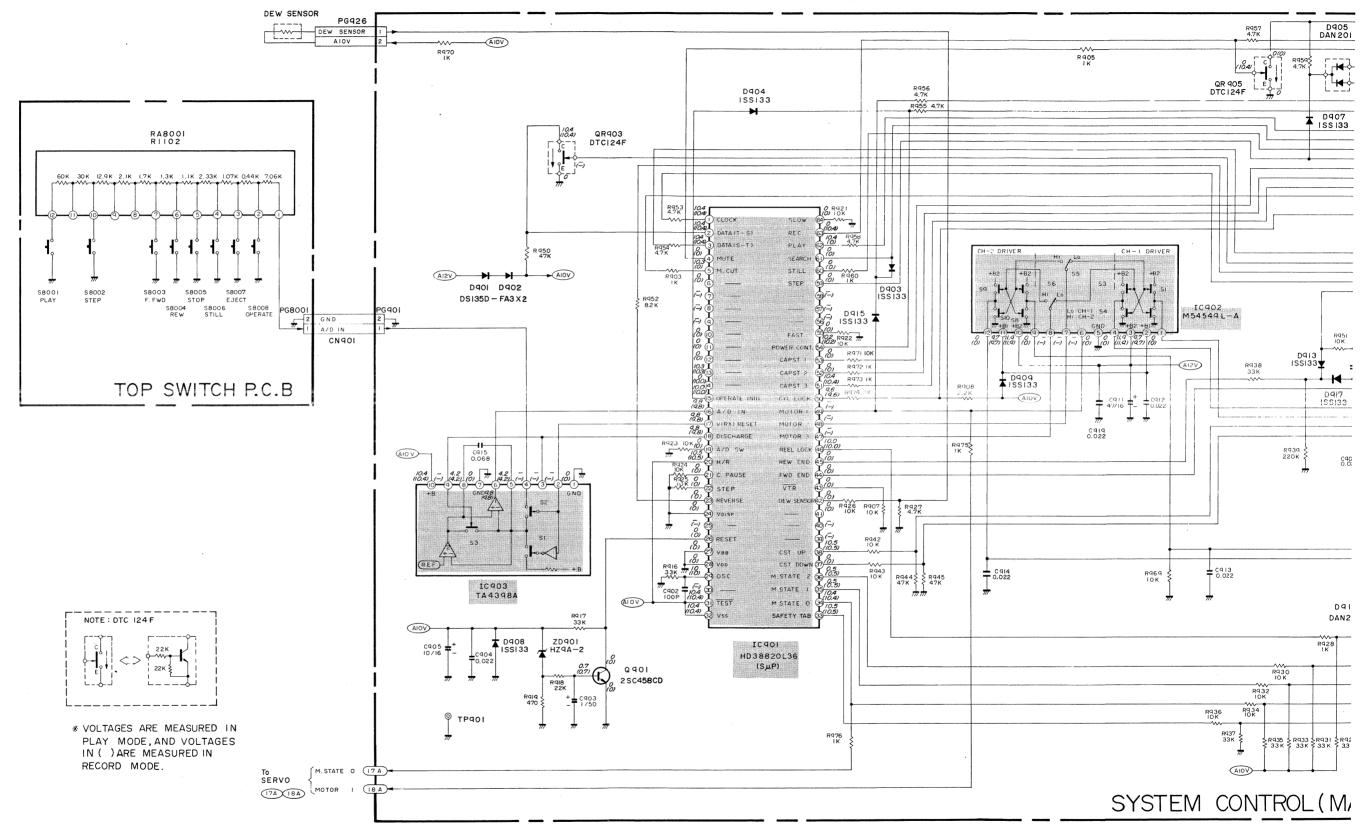




SYSTEM CONTROL MAIN

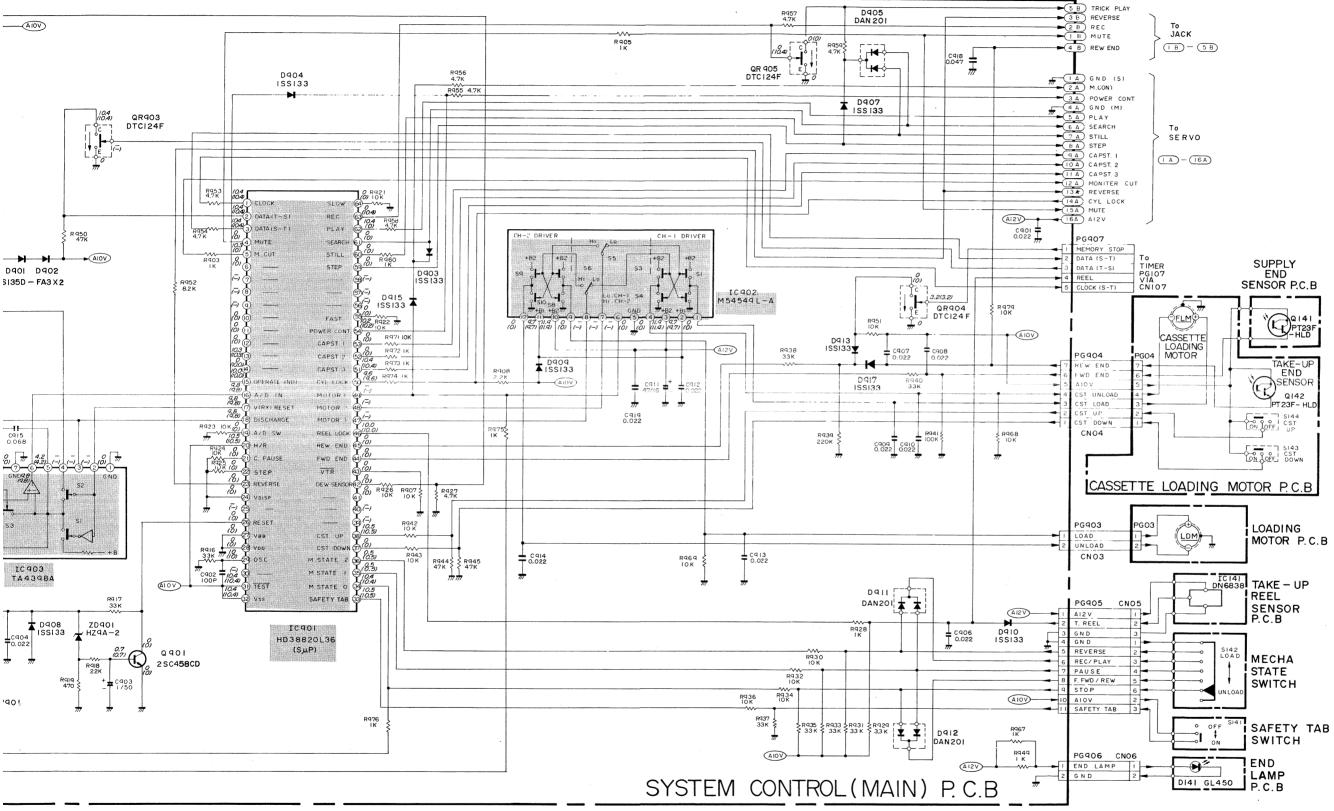
MAIN PCB FOR TYPE 4491 (H) 8004606 AND TYPE 4493 (CT) 8004579

FOR TYPE 4492 (BS) 8004578 - TOP SWITCH 8004546

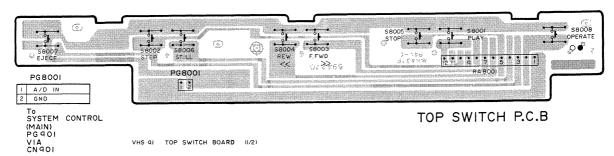


* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN() ARE MEASURED IN RECORD MODE.

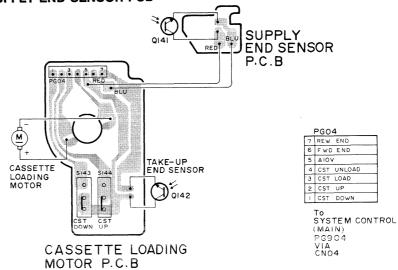
FOR TYPE 4492 (BS) 8004578 - TOP SWITCH 8004546



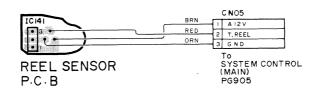




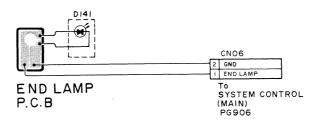




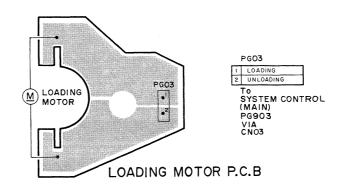
REEL SENSOR PCB

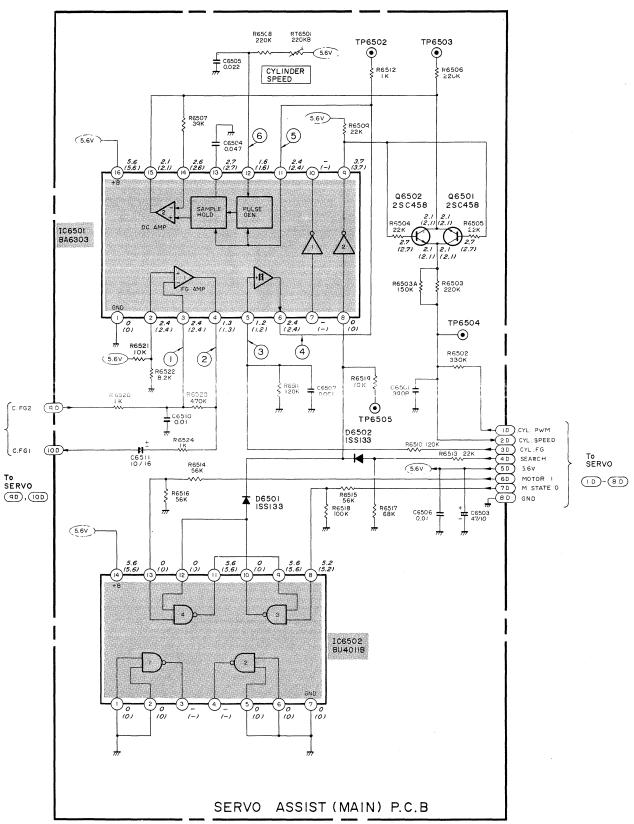


END LAMP PCB



LOADING MOTOR



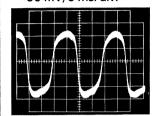


* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.

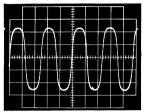
SERVO CIRCUIT WAVEFORM

[IC601]

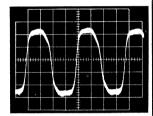
1 PIN 1 PB/REC 50 mV/5 ms. div.



§ PIN 14 PB/REC 0.5V/2 ms. div.

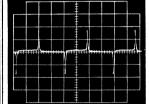


② PIN 2 PB/REC 50 mV/5 ms. div.

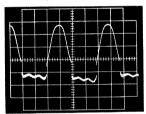


[IC602]

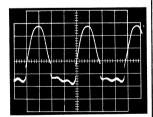
① PIN 7 PB 1V/10 ms. div.



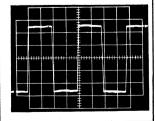
③ PIN 7 PB/REC 0.2V/5 ms. div.



4 PIN 9 PB/REC 0.2V/5 ms. div.

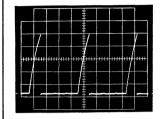


⑤ PIN 11 PB/REC 0.2V/5 ms. div.

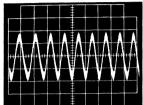


[IC604]

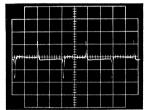
8 PIN 3 PB 0.5V/10 ms. div.



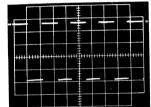
(3) PIN 22 PB/REC 0.1V/0.2 μs. div.



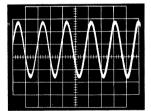
PIN 4 PB 1V/10 ms. div



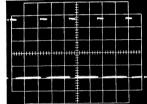
(4) PIN 27 PB/REC 1 OV/0.2 ms. div.



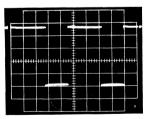
(II) PIN 10 PB/REC 0.2V/1 ms. div.



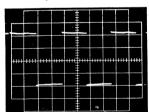
(§) PIN 28 PB/REC 1 OV/0.2 ms. div.



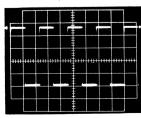
1 PIN 12 PB/REC 1V/0.2 ms. div



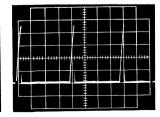
(6) PIN 31 PB/REC 10V/10 ms. div.



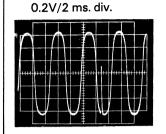
① PIN 15 PB/REC $1V/50 \mu s. div.$



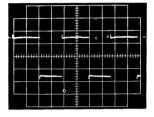
① PIN 35 PB/REC 0.5V/5 ms. div.



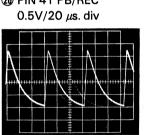
[IC604] **18** PIN 37 PB/REC



(9) PIN 39 REC 1V/10 ms. div.

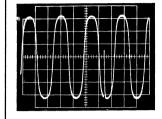


20 PIN 41 PB/REC

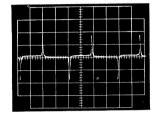


[TEST POINT]

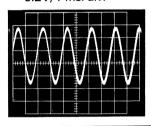
②1 TP602 PB/REC 0.2V/2 ms. div.



22 TP605 PB 1V/10 ms. div.

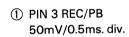


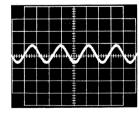
23 TP606 PB/REC 0.2V/1 ms. div.



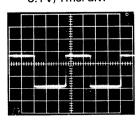
SERVO ASSIST CIRCUIT WAVEFORMS

[IC6501]

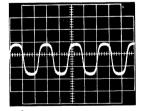




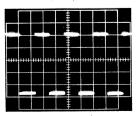
2 PIN 4 REC/PB 0.1V/1ms. div.



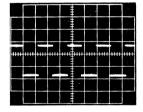
3 PIN 5 REC/PB 50mV/2ms. div.



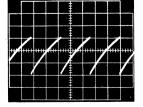
4 PIN 6 REC/PB 0.1V/2ms. div.



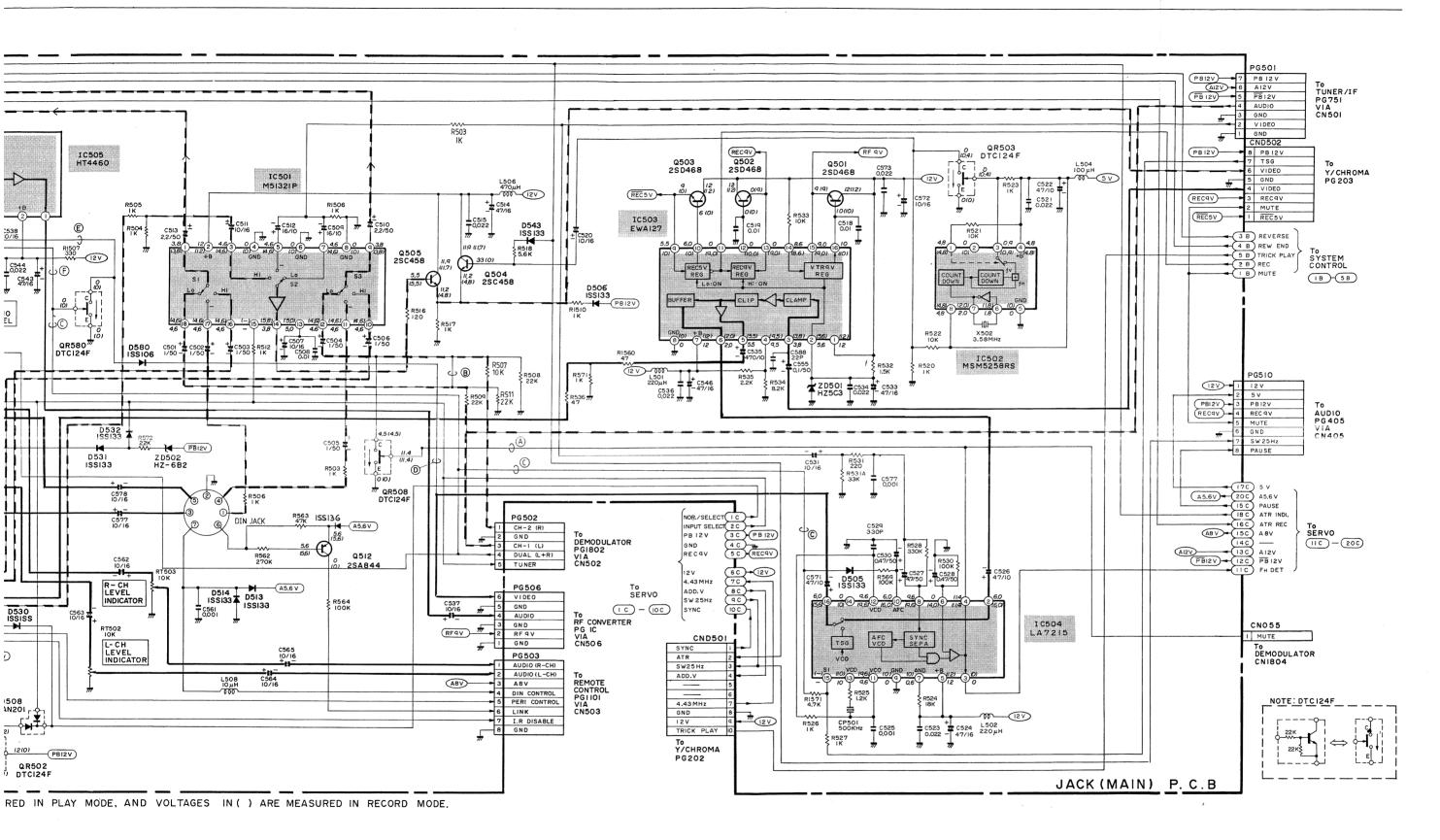
⑤ PIN 11 REC/PB 0.2V/2ms. div.



6 PIN 12 REC/PB 0.1V/2ms. div.



-38



	PG501
I	GND
2	VIDEO
3	GND
4	AUDIO
5	PB12V
6	A12 V
7	PBI2V

TO TUNER / IF PG 751 VIA CN501

1	CH-2 (R)
2	GND
3	CH-I (L)
4	DUAL (L+R)
5	TUNER

To DEMODULATOR PG 1802 VIA CN 502

PG 503

1	AUDIO (R-CH)
2	AUDIO (L - CH)
3	A8V.
4	DIN CONTROL
5	PERI CONTROL
6	LINK
7	I-R DISABLE
8	GND

TO REMOTE CONTROL PG!IO! VIA CN503

PG504

-	AUDIO	(L - CH)
2	GND	
3	AUDIO	(R - CH)

To AUDIO PG 406 VIA CN406

PG 505

1	AUDIO	(L -CH)
2	GND	
3	AUDIO	(R-CH)

To AUDIO PG 407 VIA CN 407

PG506

	GND
2	RF4V
3	GND
4	AUDIO
5	GND
6	VIDEO

To RF CONVERTER PG IC VIA CN506

PG507

1	GND (M)
2	TIMER INDI.
3	DOLBY INDI.
4	REC INDI.
5	A12 V
6	ATR INDI.
7	HI-FI INDI

To INDICATOR PG 8101 VIA CN507

PG 508

1	REW END
2	DOLBY
ş	REVERSE
4	LINEAR/HI-FI
5	VTR/ATR

To TIMER PGIO5 VIA CNIO5

PG509

_	NORMAL
2	DOLBY
3	Hi-Fi INDL

To AUDIO PG404 VIA CN404

PG510

I	12V
2	5V
3	PB12V
4	RECAV
5	MUTE
6	GND
7	SW25Hz
8	PAUSE

To AUDIO PG405 VIA CN405

IC501

18	4.6 (4.6)	1	3.8 (3.8)
17	4.6(4.6)	2	12 (12)
16	4.6(4.6)	3	4.6(4.6)
۱5	- (-)	4	0 (0)
14	3.8 (5.8)	5	4.6(4.6)
13	5.0(5.0)	6	0 (0)
12	4.6 (4.6)	7	4.6 (4.6)
11	4.6(4.6)	8	0 (0)
10	4.6 (4.6)	q	3.8 (3.8)

IC502

7 2.0 (2.0) 2 0 (0	`
6 1.8 (1.8) 3 0.9(0.9	4)
5 0 (0) 4 4.8 (4.	8)

IC503

6	10 (10)	ı	12 (12)
15	9.0 (9.0)	2	5.6(5.6)
14	8.6 (8.6)	3	3.8 (3.8)
13	(O.P)	4	9.5 (9.5)
12	0(10,0)	5	5.5 (5.5)
11	0 (9.0)	6	2.0(2.0)
10	6.0 (0)	7	12 (12)
q	5.5 (0)	8	0 (0)

IC504

		-			
15	-	(-)	16	6.0	(5.6)
13				0	
П	9.0	6(9.6)	12	9.6	(9.6)
q	0	(0)	10	6.0	(6.0)
7	0	(0.6)	8	9.6	(9,6)
5	12	(12)	6	0	(4.0)
3	0	(0)	4	11.4	(11.4)
-	-		2	6.0	(6.0)

Q509

B 2.5(2.5)

C 10.1 (9.9)

E 1.9 (1.9)

0.501

	00,
В	10 (10)
С	12 (12)
F	0 101

QR501

B 0 (12) C 12 (12) E 12 (12)

QR502 B (0) C 0 (12) E 0(0)

Q 502

B 0 (0)

C 12 (12)

E 0 (9)

E 9 (0)

Q R503 B 0.4(0.4 C 0 (0.4 E 0(0)

Q503

B 6 (0)

C 12 (12)

C 11.9(11.7 E 11.2 (4.8

Q504

B 3.3(0) QR505

B 0(5.6) C 0(0)

E 0(0)

B 5.5(5.5) C 11,9(11,7 QR506

Q 505

QR507 B 0(5.6) C 0(0) E 0(0) B 11,4(11,4) c 4.5 (4.5 E 0 (0)

Q 508

В	2.4(24)
С	0 (0)
Ε	2.4 (2.4)

QR508 B 11.4(11.4) C 4.5(4.5) E 0 (0)

Q510

В	2.6(2.6)
С	10(9.9)
ш	2.0 (2.0)
-	

B 0 (5.6)

C 0(0)

B 5.6(5.6) C 0 (0) E 5,6(5.6) QR509

QR510 B 0 (5.6) C 0 (0) E 0 (0)

Q512

Q	R515	
В	8.2(11.6)	
С	0 (0)	
Ε	0(11.7)	

QR580

B 0(0)

C 0(0) E 0(0)

QR516

В	(8,11) P.11
U	0 (0)
Е	11.7 (11.9)

BOSOL

	PG601
-	C. FG(+)
2	C. FG(-)
3	FOWARD
4	GND
=	DEWIND

To CAPSTAN MOTOR PGOIM VIA

PG602

ı	HALL BIAS(+)
2	HALL BIAS (-)
3	TACH PULSE
4	CYL. FG(+)
5	CYL. FG(-)
6	E (+)
7	HALL BIAS (-)
8	E (-)
q	HALL BIAS(+)
0	12V/16V
	3 4 5 6 7 8

11 L1 12 L2 To CYL.MOTOR PG481,PG482 PG483 VIA CNO2

PG604

	TRACKING I .
2	TRACKING 2
3	INPUT SELECT
4	NOR./ SELECT

FUNCTION SWITCH PG 9901 VIA CN 604

PG607

2	A17V
1	GND

To HEATER CNO7

PG605

1	A5.6 V
2	AI7V
3	AC CLOCK
4	GND
=	4 DET

To V.S TUNING PG 706 VIA CN605

PGGGB

	- 550	70
-	CTL	PULSE
2	GND	

To CONTROL HEAD PGO8 VIA CNO8

PG606

_	F G G G G
	AI7V
2	AC CLOCK
3	P. CONT
4	M. START
5	GND (M)
6	A12V
7	GND (S)
8	12V
q	12V/16V
10	
П	A8V

То REGULATOR PGI51 VIA CN151

Bang&Olufsen

			I C 6 O I		IC6	02 T	C603	10604	
	9 10	11 12	13 14	15 16		<u> </u>		42 - (-) 1 - (-)	7
	-(-) 4.8(4.	.8) -(-) 0(0)	0(0) -(-	-) 2.5 (2.5) 2.4(2.5			0(0)	41 -(-) 2 0(0)	
	8 7	6 5	4 3				+	40 4.8(4.8) 3 -(-)	
	0(0) -(-)	4.3(4.3) 0 (0)	0(0) 2.6	2.6) 2.7(2.7) 2.7(2.	7) 5 00			39 0.3(-) 4 -(-) 38 0(0.3) 5 4.2(4	
					Li-			37 -(-) 6 -(-)	
			IC6501		2 - (36 0(0) 7 0(0)	7
	1 2	3 4	5 6					35 -(-) 8 0(0)	\dashv
	0 (0) 2.4(2.	.4) 2.4(2.4) 1.3 (1	12 1		4			34 0(0) 4 0(0) 33 0(0) 10 -(-)	-
		.1) 2.6(2.6) 2.7(2			7)	2		32 0(2.3) 11 0(0)	3
						1		31 -(-) 12 -(-) 30 2.5(2.5) 13 0(0)	4
	1065	502	ICE	05	ICE	507		29 0(0) 14 0(-)	-
	14 5.6 (5.6) 1	0 (0)	1 2	3	2 3	1		28 -(-) 15 -(-)	
	13 0 (0) 2		5.6(5.6) 0(0	(P) P (4)	5.6 (5.6) 0	(0) 10.8(10.8)		27 - (-) 16 0(0)	_
	12 0 (0) 3	- (-) - (-)					,	26 2.3(2.3) 17 O(0) 25 2.2(2.2) 18 2.9(2	a)
	10 0 (0) 5	0 (0)	IC6	06				24 2.6(2.6) 19 2.4(2	
	9 5.6 (5.6) 6	0 (0)		2				23 2.3(2.3) 20 2.5(2	
	8 5.2 (5.2) 7	0 (0)	10.8(10.8)	(8,01)8.01				22 -(-) 21 3.0(3	.0)
	0.000	0000	00005	Q607	0000	0.011	OBSOS		
Q601	Q602 B -(-)	Q603 B 4.4(4.4)	QR605	B 11.4(12.3)	Q608 B 2.5(0)	Q611 B (9,4(9,4)	QR606	Q612 B 3.0(3.0)	Q613 B 3.0(3.0)
B 0.6(0.6)	C -(-)	C 5.6(5.6)	C O (O)	C 3 (12.1)	C (2.0(0)	C 0(0)	Ç 11.9 (11.9)	C 0(0)	C 3.7(3.7)
E 0(0)	E 11.5 (11.5)	E 5.6(5.6)	E 0 (0)	E 12.3(12.3)	E 12.1 (12.1)	E 4.8(4.8)	E .O (O)	E 2.9(2.9)	E 2.9 (2.9)
		Q615	Q618	QR601	QR623	QR602	QR603	QR604	Q619
Q614	QR621	B 0(0)	B (1.8(1.8)	B 8.1(8.1)	B 11.9(11.9)	B - (-)	B 8.9(6.6)	B 8.9(0)	B 4.7(4.7)
B 0(0) C 2.3(2.3)	C 1.6 (1.6)	C 2.3(2.3)	C 2.3(2.3)	C 0(0)	C 0 (0)	C -(-)	C 12.3(0)	C 0(4.3)	C 0 (0)
E 0(0)	E 11.9 (11.9)	E 0(0)	E 2.4(2.4)	E 0(0)	E 0 (0)	E 0(0)	E 0(0)	E 0(0)	E 0 (0)
QR610	QR613	QR616 B 11.9 (0)	QR619 B 2.3(2.3)	Q6501 B 2.7(2.7)	Q6502 B 2.7(2.7)				
C 10.6(10.6)	C -(-)	C (O(O)	C 2.3(2.3)	C 2.1(2.1)	C 2.1(2.1)				
E 0(0)	E 0(0)	E 0(0)	E 2.3(2.3)	E 2.1(2,1)	E 2.1(2.1)				
PG901		PG903		904	PG905		PG906		10901
1 A/D IN 2 GND	2	LOAD		T DOWN	1 AI2V 2 T. REEL		I END LAMP 2 GND	63 0(10	
То		То		ST LOAD	3 GND		То	62 10.4	
TOP SWIT		LOADING MOT		T UNLOAD	4 GND		END LAMP	61 000)) 4 0(0)
PG8001 VIA		PG 03 VIA		OV END	5 REVERSE		CNO6	60 0(0	
CNGOI		CNO3		VD END	6 REC/PLA	17		59 0(0 58 –(-	
PG907		PG 426			8 F.FWD/R	EW		57 - (-	
I MEMORY S		DEW SENSO		SSETTE	4 STOP			56 -(-	·) q -(-)
2 DATA (S-T) 3 DATA (T-S)	2	AIOV		ADING MOTOR 04	IO AIOV	TAB		55 0 (0	
4 REEL		To DEW SENSO	D VI		То			53 0 0	(10.2) 11 0(0)
5 CLOCK (S-T)		CN	04	TAKE-UI	P		52 0(0) 13 10.3(10.3)
To TIMER					REEL SE MECHA	ENSOR/		51 10.40	
PGIO7					SWITCH			50 9.60 49 - (-	(9.6) 15 10.0(10.0) 16 9.8(9.8)
VIA CNIO7					SAFETY			48 - (-	
CNIO					SWITCH CN 05	•		47 - (-	
IC902	10403							46 10.0 45 00	
2 9.7(9.7)	10 10.4(10.4) q -(-)							44 00	
3 11.9(11.9)	8 4.2(4.2)							43 000) 22 0(0)
4 0(0)	7 0(0)							42 0(0	
5 0(0)	6 9.8(9.8)							41 00	
6 -(-)	5 4.2(4.2) 4 -(-)							39 -(-	
8 -(-)	3 -(-)							L	(10.5) 27 (00)
q 0(0)	2 -(-)							37 000	0) 28 0(0)
10 11.9(11.9)	1 0(0)								(0.5) 30 – (–)
12 0(0)								34 10.4	(10.4) 3 1 10.4(10.4)
								33 10.5	(10.5) 32 10.4(10.4)
Q 901	QR903	QR904	QR905						

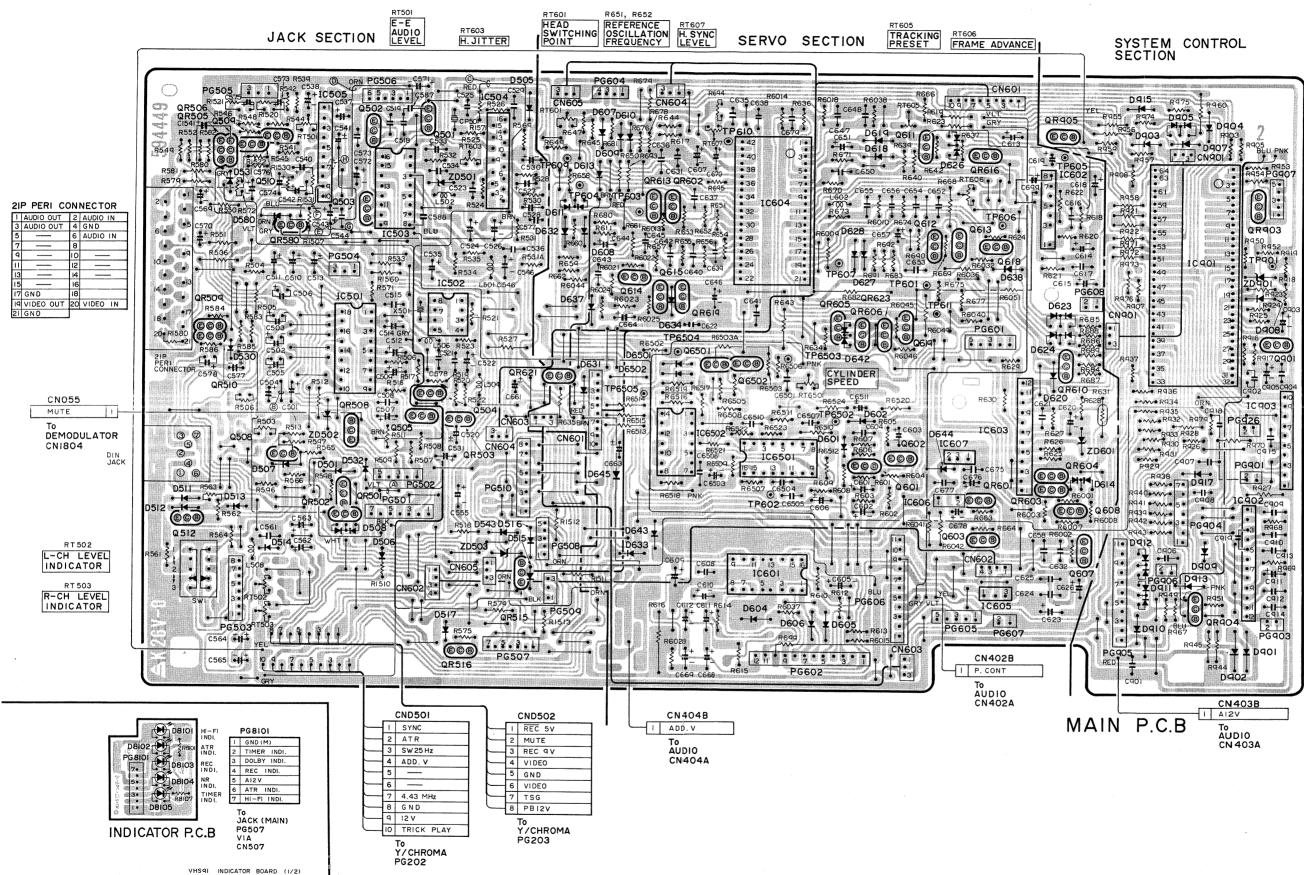
10P Q B 0.7(0.7) C 0(0) E 0(0)

> QR903 B -(-)
> C IO.4(IO.4)
> E O (O)

QR904 B 3.2(3.2) C O(O) E O(O)

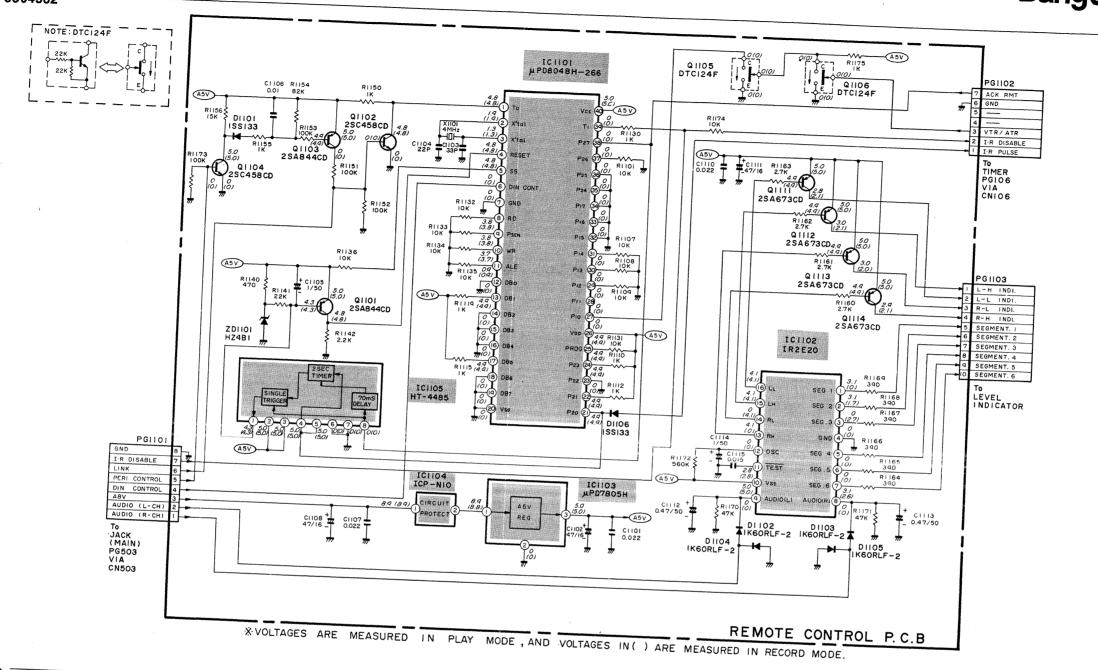
QR405 B 0(10.4) C 0(0) E 0(0)

VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE. MAIN PCB



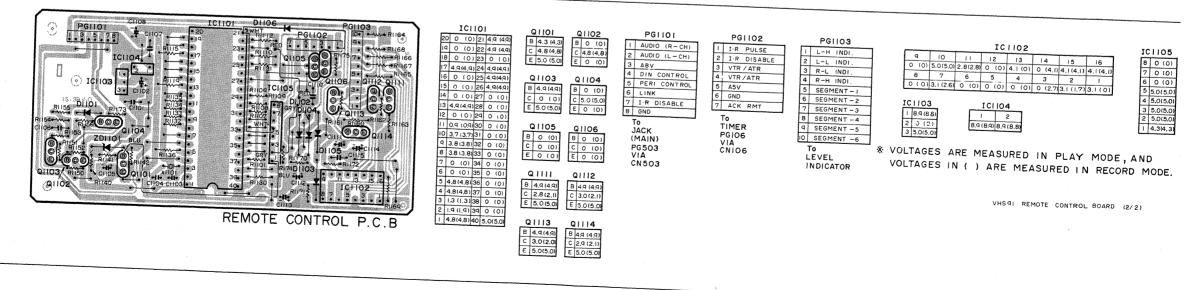
VHS 41 MAIN BOARD (1/2)



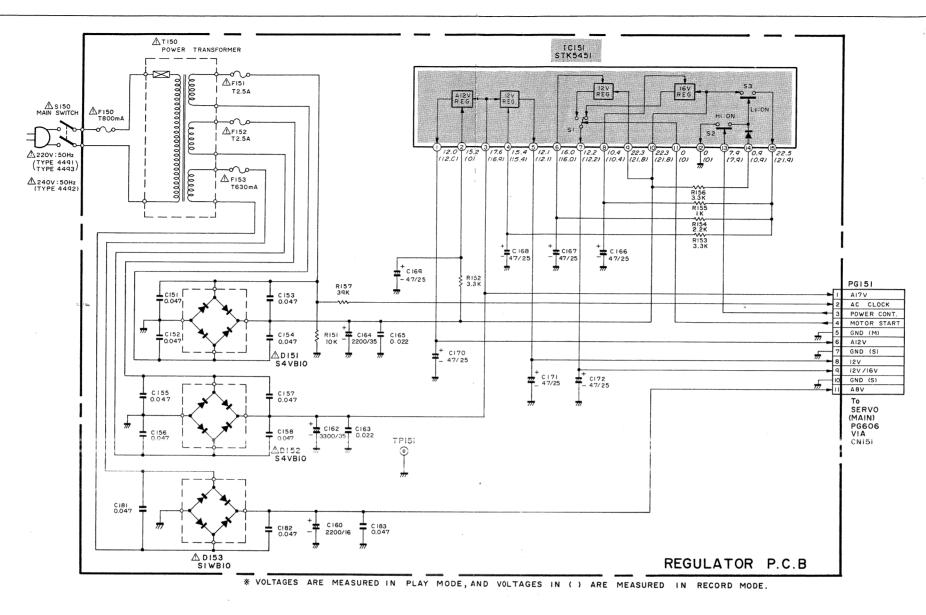


REMOTE CONTROL PCB

VHS41 REMOTE CONTROL SCHEMATIC

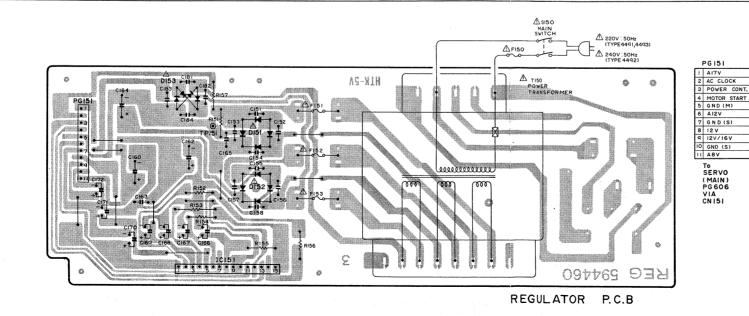


REGULATOR REG 8004589



VHS91 REGULATOR SCHEMATIC





* VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN () ARE MEASURED IN RECORD MODE.

VHS 91 REGULATOR BOARD (1/2)

LIST OF ELECT	RICAL PARTS	Parts not mentioned	are standard			
8004538 Tuner/IF Block I Type 4492	BS		Tuner IF block 8004538 is a single unit, and consists of: UHF tuner, IF and booster. With failure in this block we recommend replacing. PAL I			
8004595 Tuner/IF Block (Type 4493	CT	Tuner IF block 8004 With failure in this h PAL B G S-tuner.		unit, and consists of: VHF/UHF tuner, IF and booster. mend replacing.		
8004540 Tuner/IF Block I Type 4491	н	Tuner IF block 8004 With failure in this b PAL B G	540 is a single block we recom	unit, and consists of: VHF/UHF tuner, IF and booster. mend replacing.		
8504541 RF Converter Type 4492		RF Converter 800454 PAL I	41 is a single ur	ait.With failure in this block we recommend replacing.		
8004542 RF Converter Type 4491 Type 4493		RF Converter 8004542 is a single unit. With failure in this block we recommend replacing. PAL B G and PAL B G S-tuner.				
8004546 Top Switch	Thick film	R1102	5030022	RA: 8001		
	Switch	Micro	7400268	S: 8001, 8002, 8003, 8004, 8005, 8006, 8007, 8008		
8004549 Infrared Receiver INF	Filter	38 KHz bypass	8020497	LO: 051		
Type 4491 H Type 4492 BS	Diode IR	Infrared PH 302	8030130	PD: 051		
Type 4493 CT	IC	μPC 1473 HA	8340879	IC: 051		
8004576 Y-Chroma WYC Type 4492 BS	Safe Resistor	68Ω 1W	5020797	R: 238, 246		
	Var. Resistor	1kΩ	5370279	RT: 201, 202		
	Delay	Delay EQ 1H Delay 2h Delay	6240023 6240015 6240024	CP: 206 CP: 204 CP: 207		
	Switch	3 pos.	7400337	S: 201		
	Coils	12 mH 10 µH 15 µH 27 µH 33 µH 39 µH 39 µH 39 µH 56 µH 100 µH 330 µH	8020498 8020487 8020615 8020501 8020620 8020614 8020489 8020618 8020624 8020613 8020499	L: 220 L: 217, 219 L: 209 L: 216 L: 202, 215, 218 L: 208 L: 221 L: 243 L: 242 L: 206, 207 L: 201, 223		

	Filter	1.5 MHz HPF 4.43 MHz BPF 5 MHz Peaking	8030109 8030102 8030100	CP: 202 CP: 208 CP: 203
	Z-Diode	HZ 6A 2	8300528	ZD: 351
	Diode	DAN 201 1SS 106 1SS 133	8300440 8300524 8300439	D: 203 D: 205, 206, 207 D: 202, 204, 208, 211, 352
	Transistor stage	DTC 124F	8320585	Q: 203
	Transistor	2SA 844D 2SC 458 2SC 535C 2SC 2021S	8320584 8320677 8320678 8320590	Q: 214 Q: 201, 209 Q: 208 Q: 202, 203, 205, 206, 207, 212, 213, 220
	IC	HA 11797	8340869	IC: 201
	Thickfilm	HT 4507A HT 4509B	8350046 8350047	IC: 202 IC: 203
8004577 Y-Chroma WYC Type 4491 H	Safe Resistor	68Ω 1W	5020797	R: 238, 246
Type 4493 CT	Var. Resistor	470 Ω 1ΚΩ	5370344 5370279	RT: 351 RT: 201, 202
	Delay	Delay EQ 1H Delay 2h Delay	6240023 6240015 6240024	CP: 206 CP: 204 CP: 207
	Switch	3 pos.	7400337	S: 201
	Coils	Trap 12mH 10 µH 15 µH 27 µH 27 µH 33 µH 39 µH 39 µH 39 µH 56 µH 100 µH	8020622 8020498 8020487 8020615 8020501 8020612 8020620 8020614 8020489 8020618 8020624 8020613 8020499	L: 351 L: 220 L: 217, 219 L: 209 L: 216 L: 353 L: 202, 215, 218 L: 208 L: 221 L: 243 L: 243 L: 242 L: 206, 207 L: 201, 223
	Filter	1.5 MHz H P F 4.43 MHz BPF 4.5 MHz Filter 5 MHz Peaking	8013109 8030102 8030098 8030100	CP: 202 CP: 208 CP: 351 CP: 203
	Z-Diode	HZ 6A 2	8300528	ZD: 351
	Diode	DAN 201 1SS 106 1SS 133	8300440 8300524 8300439	C: 203 D: 205, 206, 207 D: 202, 204, 208, 211, 351, 352, 354
	Transistor stage	DTC 124F	8320585	Q: 203

	Transistor	2SA 844D 2SC 458 2SC 535C 2SC 2021 S	8320584 8320677 8320678 8320590	Q: 214 Q: 201, 209 Q: 208 Q: 202, 203, 205, 206, 207, 212, 213, 220
	IC	BA 7025L HA 11797	8340870 8340869	IC: 351 IC: 201
	Thickfilm	HT 4507A HT 4509B	8350046 8350047	IC: 202 IC: 203
8004578 MAIN PCB	Plug Panel	Scart/DIN	3168685	
Servo/Jack/ System Control JSS	Resistor	150 Ω/1W	5100229	R: 682
Servo	PTC	4.7Ω	5230017	R: 631, 699
Type 4492 BS	Var. resiator	10 ΚΩ 100 ΚΩ 220 ΚΩ 470 ΚΩ	5370271 5370292 5370276 5370345	RT: 501, 502, 503 RT: 601, 603 RT: 605, 606, 6501 RT: 607
8004579 MAIN PCB	Switches	3 pos.	7400344	SW: 1
Servo/Jack/ System Control	Rec. prevention switch		7400306	S: 141
JSS Servo	Mechanical state swich		7400307	S: 142
Type 4493 CT	Cassette down switch		7400345	S: 143
8004606 MAIN PCB Servo/Jack System Control	Cassette up swich		7400345	S: 144
JSS Servo Type 4491 H	Coil	10μ H 100μ H 220μ H 470μ H 820μ H	8020487 8020491 8020488 8020492 8020485	L: 508 L: 504 L: 501, 502 L: 506 L: 602
	Crystal	500 KHz 3,58 MHz	8030099 8090032	CP: 501 X: 502
	Diode	DAN 201 DS 135D-FA3 1SS 106 1SS 133	8300440 8300452 8300524 8300439	D: 508, 611, 614, 623, 624, 626, 905, 911, 912 D: 901, 902 D: 580 D: 501, 505, 506, 507, 511, 512, 513, 514, 515, 516, 517, 530, 531, 532, 543, 601, 602, 604, 605, 606, 607, 608, 609, 610, 613, 618, 619, 620, 627, 628, 631, 632, 634, 637, 638, 643, 644, 645, 903, 904, 907, 908, 909, 910, 913, 915, 917, 6501, 6502
	Z-Diode	HZ 9A2 HZ 5C3 HZ-6B2 HZ 9A2	8300453 8300525 8300536 8300453	ZD: 601, 901 ZD: 501 ZD: 502 ZD: 503

8004580 Audio AUD

Transistor	DTA 124F DTC 124F	8320608 8320585	QR: 501, 515, 516, 619, 621 QR: 502, 503, 507, 508, 580, 601, 602, 603, 604,
stage			605, 606, 610, 613, 616, 623, 903, 904, 905
	DTC 144F	8320686	QR: 505, 506, 509, 510
Transistor	2SA 673C	8320675	Q: 603
THISISTOI	2SA 673C-TB	8320688	Q: 608
	2SA 844	8320681	Q: 508, 512
	2SA 844CD-TB	8320687	Q: 602, 611, 612, 618, 619
	2SA 952ML2 2SC 458	8320593 8320674	Q: 607 Q: 504, 505, 509, 510, 601, 615, 901, 6501, 6502
	2SC 458-TB	8320677	Q: 613, 614
	2SD 468	8320676	Q: 501, 502, 503
End lamp	GL 450	8330173	D: 141
Supply end	PT 23F	8330176	Q: 141
sensor			Q. 111
Take-up end sensor	PT 23F-HLD	8330177	Q: 142
Take up reel	DN 6838	8340882	IC: 141
sensor	P.4.0/2	004022	TO 000
IC	BA 340	8340635 8340897	IC: 602 IC: 6501
	BA 6303 BU 4011B	8340478	IC: 6502
	EWA 127	8340871	IC: 503
	HA 1340A	8340873	IC: 601
	HA 11843 HD 38820L36	8340881 8340875	IC: 604 IC: 901
	ICP-N5	8340875	IC: 606
	LA.7215	8340872	IC: 504
	MSM 5258RS	8340706	IC: 502
	M51321P M5278Ll-56	8340695 8340702	IC: 501 IC: 605
	M54548L	8340874	IC: 603
	M5449L-A	8340876	IC: 902
	TA 4398A μPC 780SH	8340877 8340898	IC: 903 IC: 607
Thickfilm	HT4460	8350051	IC: 505
CAD			
Safe Resistor	22Ω 1/4 W 47Ω1/4 W	5020386 5020757	R: 441 R: 442
	47Ω1/4 W		R. 442
Var. Resistor	1ΚΩ	5370279	RT: 4501 R, 4501L
1 442 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	10 ΚΩ	5370271	RT: 402 R, 402 L, 403 R, 403 L
	22 ΚΩ	5370282	RT: 4504 R, 4504 L
	47 ΚΩ 220 ΚΩ	5370270 5370348	RT: 401 R, 401 L, 4502 RT: 404 R, 404 L, 4503
Coils	15mH	8020483	L: 402 R, 402 L
	100µH	8020491	L: 4501, 4502, 4505
	470µH 820µH	8020492 8020546	L: 4503, 4504 L: 404
	Filter Block	8020484	L: 403 R, 403 L
Osc. Coil	Erase Osc.	8020623	CP: 401
Eltor.	MDVIDE	0000100	D. 461 D. 461 I
Filter	MPX L P F 20 KHz L P F	8030103 8030106	F: 451 R, 451 L F: 4502 R, 4502 L
	1.4MHz B P F	8030105	F: 4501 L
	1.8MHz B P F	8030107	F: 4501 R

8004581 Demodulator

Type 4493 CT

DEM

Crystal	1MHz	8030104	CE: 471
	Trap Coil	8030068	L: 401 R, 401 L
Diode	1SS 133	8300439	D: 472, 474, 475, 476, 493, 4501 L, 4501 R, 4502 L, 4502 R, 4504, 4505, 4506, 4507
Z-Diode	HZ 4B1	8300523	ZD: 471
	HZ 5C3	8300525	ZD: 472
Transistor	2SA 673	8320675	Q: 401
	2SA 844	8320584	Q: 471
	2SC 458	8320674	Q: 4503, 4506, 4507
	2SC 1741	8320614	Q: 4504, 4505
	2SC 2021	8320583	Q: 4501, 4502, 4508 R, 4508 L
Transistor Stage	DTC 124F	8320585	QR: 401, 402, 403, 451, 471, 472, 4501, 4502, 4503
IC	BA 5112LS D4066SIP HA 12072AN M 50760 67OP M 5241L NJM 4558 S TA 7324P TA 7361AP TA 7772P TK 15021Z	8340631 8340699 8340908 8340888 8340905 8340891 8340907 8340887 8340909 8340906	IC: 401 R, 401 L IC: 403 IC: 4503 IC: 471 IC: 451 IC: 4504 IC: 472 IC: 405 R, 405 L IC: 4501 IC: 452
Thickfilm	HT 3013	8350048	IC: 402
	HT 6212	8350050	IC: 5402
Safety res.	22Ω 1/4W	5020144	R: 1801
Var. res.	10kΩ	5370275	RT: 1801, 1802
	10kΩ	5370271	RT: 1807, 1808
	100kΩ	5370292	RT: 1803
	220kΩ	5370276	RT: 1804
	470kΩ	5370345	RT: 1805
Coils	12µH	8020629	L: 1801
	15µH	8020628	L: 1802
Filter	5.5 MHz	8030114	CF: 1802
	5.74 MHz	8030115	CF: 1801
	Aud. Detection	8030113	CF: 1803
Filter	Aud. Detection	8030112	CP: 1801
	Filter	8030066	CP: 1802
	Aud. Detection	8030112	CP: 1803
Diode	1SS 133	8300538	D: 1801
	1SS 133	8300439	D: 1802, 1803
Z -Diode	Hz 9A	8300543	ZD: 1801
Transistor	2SA 673C	8320675	Q: 1803
	2SC 2021RS	8320590	Q: 1801, 1804, 1805, 1806, 1807R, 1807L

	Trans. Stage	DTC 124F	8320585	QR: 1802
	IC	BA 4560 IR 3P02	8340738 8340922	IC: 1802 IC: 1801
8004582 Remote Control RMT	Crystal	4MHz	8090059	X: 1101
	Z-Diode	HZ 4B1	8300523	ZD: 1101
	Diode	1K 60RLF 2 1SS 133	8300537 8300439	D: 1102, 1103, 1104, 1105 D: 1101
	Transistor	2SA 673C 2SA 844CD 2SC 458C	8320675 8320584 8320674	Q: 1111, 1112, 1113, 1114 Q: 1101, 1103 Q: 1102, 1104
	Transistor stage	DTC 124F	8320585	Q: 1105, 1106
	IC	IR 2E 20 ICP N10 μPD 7805H μPD 8048H 266	8340904 8340894 8340898 8340820	IC: 1102 IC: 1104 IC: 1103 IC: 1101
8004583 Function FSW	Potentiometer	20 Kohm Rec. level 500 Kohm Tracking	5300127 5300032	RV: 9901 RV: 9902
	Switch	Micro	7400299	S: 9902, 9905, 9906, 9907, 9910, 9911, 9912, 9913, 9914, 9915, 9916, 9917, 9918, 9919, 9920, 9921, 9922, 9923
		2pos. 3pos.	7400301 7400300	S: 9909 S: 9903, 9908
	Diode	1SS 133	8300439	D: 9901
	IC	M50761-673SP PST 520F	8340883 8340878	IC: 9901 IC: 9902
8004584 Indicator IND	LED	SLR-34URS	8330001	D: 8101, 8102, 8103, 8104, 8105
8004585 TIM Timer Type 4491 H	Var. Cap.	20pF	4340921	C: 211
Type 4492 BS 8004586 TIM	Crystal	32 kHz	8090042	X: 101
Timer Type 4493 CT	Diode	1SS 133	8300439	D: 107, 108, 111, 112, 113, 114
	Z-Diode	4R7 JB1-2	8300527	ZD: 101
	Transistor	2SA 844 CD 2SC 2021RS	8320681 8320583	Q: 103 Q: 101, 102
	Display	10-BT-17ZK	8330172	DG: 101
	IC	M50752-686SP	8340889	IC: 101

8004587	
V-S Tuning	
Type 4492 E	S

8004588

V-S Tuning Type 4491 H Type 4493 CT

Coil	Osc. coil	8020610	L: 701
	100 µH	8020491	L: 702
Crystal	4 MHz	8030097	CE: 701
Z-Diode	Hz 3B	8300531	CD: 704
	Hz 4B1	8300523	ZD: 701
	Hz 5A1	8300459	ZD: 706
	Hz 15	8300458	ZD: 709, 710
	Hz 9C2	8300450	ZD: 703
	µPC 574J	8300460	ZD: 705
Diode	1SS 81	8300529	D: 704, 711
	1SS 133	8300439	D: 702, 703, 705, 706, 707, 710, 714, 717
Transistor	2SA 844CD	8320584	Q: 702
	2SC 458CD	8320674	Q: 701, 703, 704, 706, 707
	2SD 1266A	8320673	Q: 705
Transistor	DTC 124ES	8320680	QR: 701, 703
Stage	DTA 124F	8320608	QR: 702
IC	M50161-257SP	8340868	IC: 701
	M58653P	8340648	IC: 702
Fuse Res.	3.3Ω 1/4W	5020678	R: 745
Coil	Osc. coil	8020610	L: 701
	100µH	8020491	L: 702
Crystal	4 MHz	8030097	CE: 701
Z-Diode	Hz 3B	8300531	ZD: 704
	Hz 4B1	8300523	ZD: 701
	Hz 5A1	8300459	ZD: 706
	Hz 9C2	8300450	ZD: 703
	Hz 15	8300458	ZD: 709, 710
	µPC 574J	8300460	ZD: 705
Diode	1SS 81	8300529	D: 704, 711
	1SS 133	8300439	D: 701, 702, 703, 704, 705, 706, 707, 710, 713, 714, 717
Transistor	2SA 844CD	8320584	Q: 702
	2SC 458CD	8320674	Q: 701, 703, 704, 706, 707
	2SD 1266A	8320673	Q: 705
Transistor	DTA 124F	8320608	QR: 702
Stage	DTC 124ES	8320680	QR: 701, 703
IC	LA 7910	8340654	IC: 703
	M50161-257SP	8340868	IC: 701
	M58653P	8340648	IC: 702

8004589	
Regulator	REG

Mains cord	Type 4491, 4493 Type 4492	6271102 6271022		
Fuses	630mA/T Slow 800mA/T Slow 2.5A/T Slow	6600005 6600011 6600020	F: F: F:	153 150 151, 152
Switch	Mains	7450067	S:	150
Transformer	220V/50Hz Type 4491, 4493 240V/50Hz 4492	8013380 8013381	T: T:	150 150
Diode	S4VB10	8300445	D:	151, 152, 153
IC	STK 5451	8340867	IC:	151

MECHANICAL PARTS LIST

0101	3164624	Top cover	0225	3015125	Guide roller
0101		Top cover White	0226		Guide base holder
0101		Bottom cover	0229		Tape guide
0102	3103236		0230	2812102	
0104	3103237		0231	2854096	Impedance arm assembly
0101	010000.				•
0105	3168671	Left panel	0232	8600082	F E Head
0105		Left panel White	0233	2810179	Spring
0106		Right panel	0234	8600098	Audio control head
0106		Right panel White	0235	2812103	Spring
0107		Front Panel top	0236	2622015	Washer
		-	0237	2854107	Sub brake
0108	3168692	Aluminium profile	0238	2810177	Spring
	3168681	Operating panel with buttons			
		Type 4491	0239	8400161	Capstan motor
	3168695	Operating panel with buttons	0240		Recording prevention arm
		Type 4492	0241	7400306	
	3168694	Operating panel with buttons	0242		Polyside washer
		Type 4493		2854100	Pressure roller arm
0109		Cassette door	0243		Pressure roller assembly
0110	2819220		0246	2819200	
0114	2548226		0247		X-adjust screw
0115		Buttons Primary function	0248		Mech. state switch
0116	2548227	Bracket	0252	3458420	Cap
0120	2202420	Campan mlata	0255	2576193	Caller
0120		Screen plate Rubber cushion	0256		
0125		Fuse cover	0301	2819219	Clutch plate assembly
0125		Rail section botton	0301	2732069	- ·
0127		Damping mechanism	0302		Brake slider
0127	2100000	Damping mechanism	0000	3013032	Diake since
0129	2776067	Knop tracking	0304	2854094	Mode slider
0130	3112318		0305	2819202	
0131	2391058		0306		Loading gear assembly
0132		Mains transformer 220 Volt	0307		Tension arm
		Mains transformer 240 Volt	0311		Loading motor assembly
0134	3164564	Switch cover	0312	2732075	
0135	7200016	Fuse Holder	0313	2732071	
0136		Mains Swich	0314		Flywheel
0138		Jack plate	0315		Polyside washer
0146	6600020	Fuse 2.5A/T Slow	0316	2622374	Washer
01.47	CCOOODE	France 620 A /T. Slaver	0917	2722072	D-14
0147		Fuse 630mA/T Slow	0317	2732072	
0150 0155		Fuse 800mA/T Slow Cover for heatzink	$0318 \\ 0319$	2732077	Flywheel holder
0158			0319	2722030	Pullov
0136		Mains cable Type 4492 Mains cable Type 4491/-93	0320		Polyslider washer
	0271102	Mains Cable Type 44317-33	0521	2022311	Tolyslider washer
0202	2726141	Supply rell assembly	0322	2732069	Belt
0203		Take-up rell assembly	0323	5230016	Heater
0204	3152522	IC holder	0401	2755029	Front loading assembly
0206	2622372	Washer	0404	8054108	Cassette holder
0207	2622371	Polyslide washer	0412	2755026	Motor block assembly
				0.1004#0	
0208		Brake arm	0414		Front motor assembly
0209		Tension arm	0417		Loading gear assembly R
0210		Brake L	0423		Loading gear assembly L
0211		Brake R	0424	3454436	
0212	2810176	Spring	0425	3454435	Holder
0213	2810175	Spring	0426	2700055	Holder link assembly
0214		Tension band	0427		Door arm
0215		BT spring holder	0428	2810210	
0216		Arm bracket	0.120	2010210	oping.
0217		Idler wheel	0501	8600097	Upper and lower cylinder
			0503	2819199	Spring
0218	2854102	Loading link R assembly	0504	8013385	Stator
0219		Loading link L assembly	0505	3356049	
0220		Guide roller base	0507		Tachopulse sensor PCB
0221		Guide roller base			-
0224	3015124	Guide roller			

0901	2013099	Screw	0963	2380136	3mm nut
0903	2013080	Screw	0964	2034044	2 x 3mm Screw
0906	2013099	Screw	0965	2039028	3 x 8mm Screw
0908	2013099	Screw	0966	2070035	Screw
0922	2013080	Screw	0967		3 x 14 mm Screw
0927	2013099	Screw	0968	2380136	3mm nut
0928	2013080	Screw	0969	2013119	3 x 8mm Bind tapping screw
0929	2039028	Screw	0970		3 x 8mm Bind tapping screw
0930	2013099	Screw	0971		3 x 8mm Bind tapping screw
			0976		3 x 8mm screw
0951	2013119	3 x 8mm Bind tapping screw	00.0	2010120	
0952		3 x 8mm Bind tapping screw	0977	2013119	3 x 8mm Bind tapping screw
0954		3 x 8mm Bind tapping screw	0978		3 x 12mm with spring washer
0955		3 x 8mm Bind tapping screw	0988		3 x 10mm Screw
0956		3 x 8mm Bind tapping screw	0990		3 x 6mm Screw
0330	2013113	5 x 6mm bind tapping serew	0330	2013000	o x omm ociew
0958	2013110	3 x 8mm Bind tapping screw			
0959		Screw to tape guide			
0960		3 x 8mm Bind tapping screw			
		2.6 x 5mm Screw			
0961					
0962	2039058	3 x 12mm with spring washer			

Parts not shown

6270285 Cable 21 pin to 21 pin 6271134 Antenne Cable 6270290 Antenne Cable UK 6270284 21/6 pol A/V Box 6270277 Cable 21 pol to 6 pol 6270222 Cable DIN 7 pol to 7 pol

6270236 Cable 2 phono male to 2 phono male 6270215 Cable 4 phono male to 5 pole DIN male 3397596 Cushion upper/lower 3391900 Carton box

3390248 Soft sock

Operating Manual

3504318 Danish 3504319 Swedish 3504320 Finnish 3504321 English 3504322 German 3504323 Dutch 3504324 French

Video Stand for VHS 91

8930686 Video Stand Type 3068 for Beovision Type 33xx, Type 7xxx and VHS 91

8930706 Video Stand Type 3070 for Beovision 31xx 20" and VHS 91.

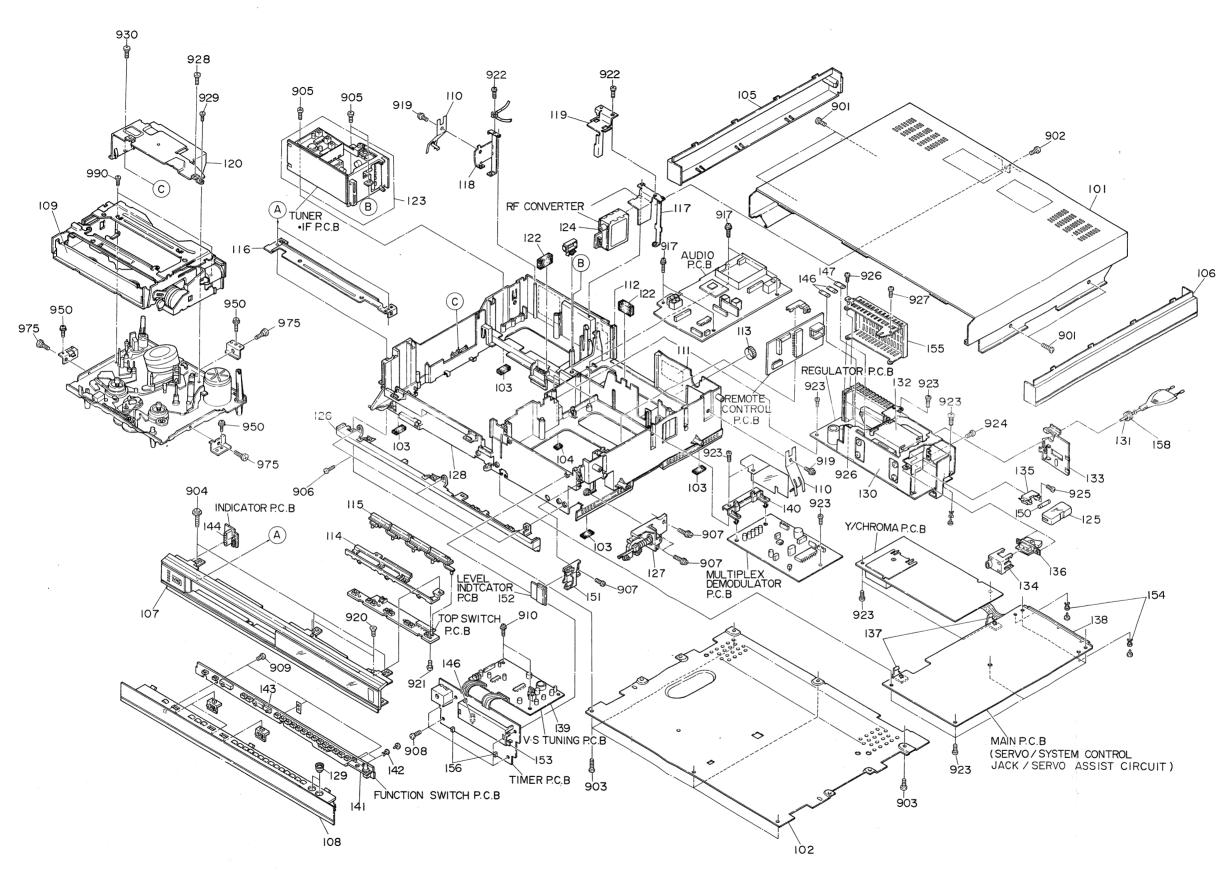
For further information, see Accessories 1. Service Manual 3538599

Servicing Tools

6780094 Back tension meter 6780093 Allignment tape (PAL) 6780100 Testcassette for x-position 3621027 Torque gauge 3014064 Torque gauge adaptor 3621026 Dummy reel 3621025 Reeldisk height jig 3040008 1.5mm hexagonal wrench 3621000 Fan type tension gauge 2576171 Height reference plate 3634000 Reference plate 3634026 Reference plate 3634024 Micrometer 6780099 Test tape HI-FI Pal 3984037 Oil kit

3627000 Video head cleaner kit

CABINET SECTION



VHS91 CABINET SECTION

3-4

TRANSPORT MECHANISM

Lubrication
Lubrication points are shown in the exploded view diagrams by marks.

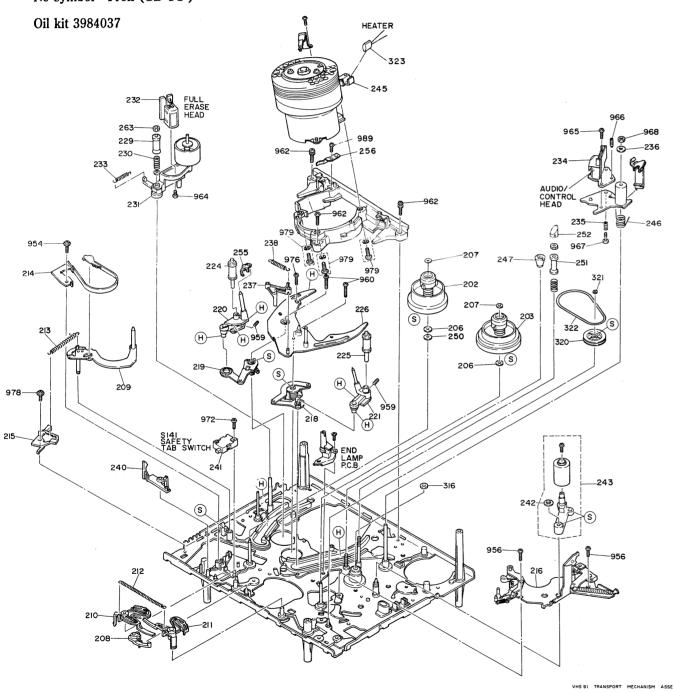
Lubricants shown in the diagram are as follows:

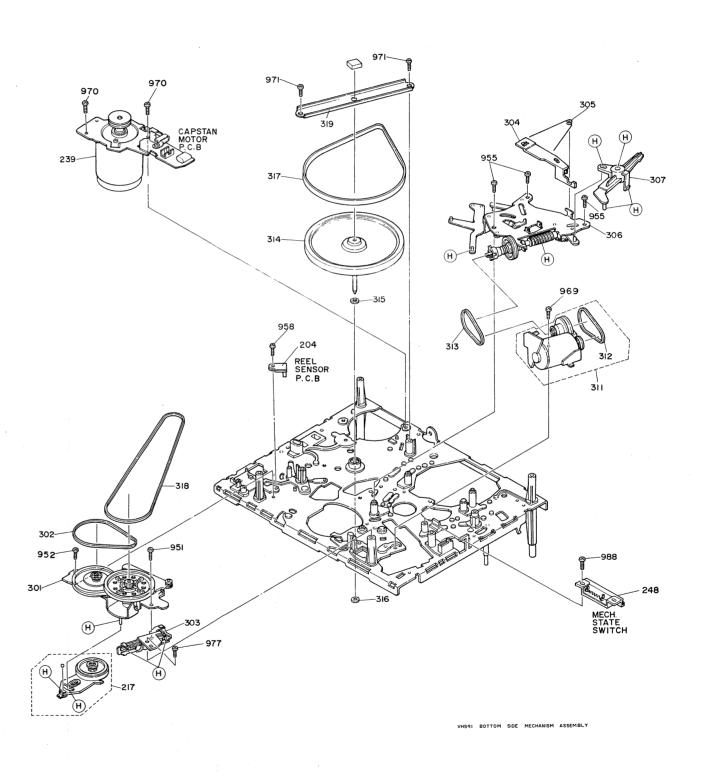
P Pan motor oil (x 10W -40)

S Sonic slider oil (# 1600)

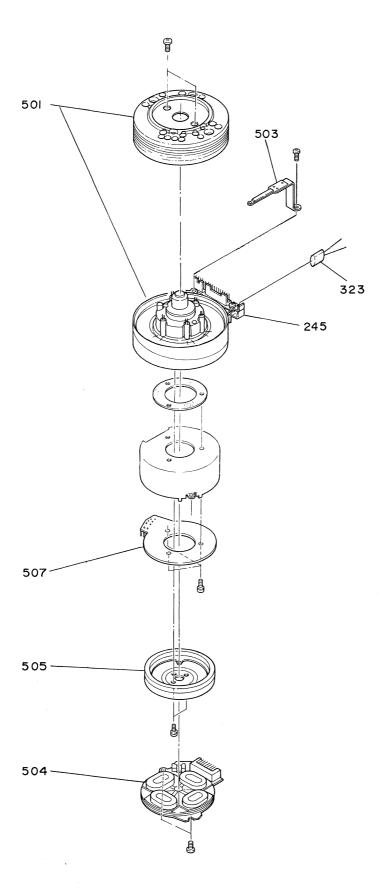
(Si) Silicone grease (KS-64)

Hitazol (MO-138)
No symbol Froil (GB-TS-)

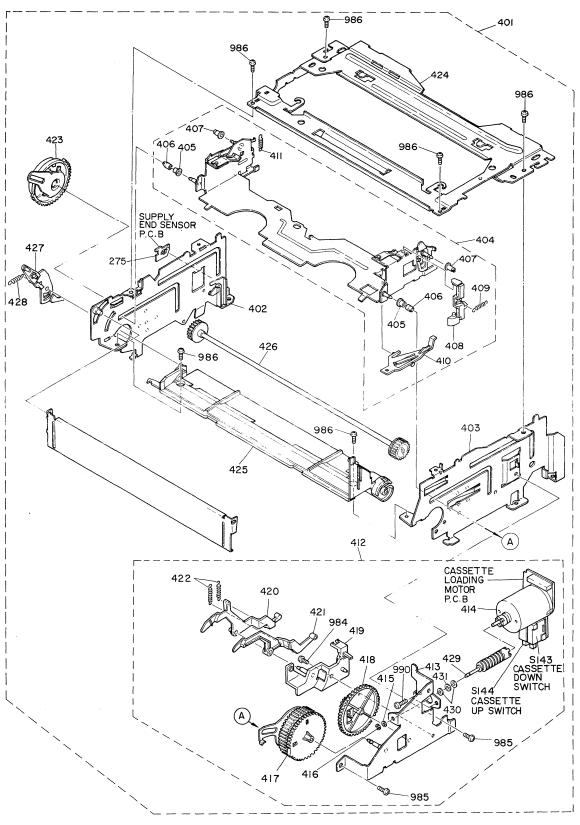




CYLINDER SECTION



CASSETTE LOADING MECHANISM



VHS91 CASSETTE LOADING MECHANISM ASSEMBLY

KNOB FUNCTION

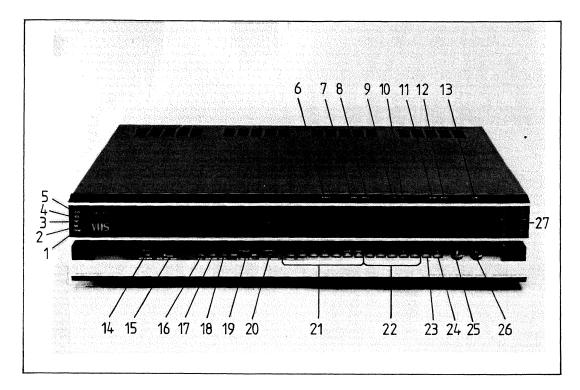


Fig. 1 Front View

- 1. TIMER INDICATOR
- 2. DOLBY NR INDICATOR
- 3. REC INDICATOR
- 4. ATR INDICATOR
- 5. Hi Fi INDICATOR
- 6. EJECT BUTTON
- 7. STEP (FRAM ADVANCE) BUTTON
- 8. STILL (PAUSE) BUTTON
- 9. ≪ (REWIND·VISUAL SEARCH) BUTTON
- 10. >> (FAST FORWARD VISUAL SEARCH)
- 11. STOP BUTTON
- 12. PLAY BUTTON
- 13. ○● (OPERATION) BUTTON
- 14. VTR/ATR SWITCH
- 15. A/V-ext.-tuner (INPUT SELELCT) SWITCH
- 16. rec BUTTON

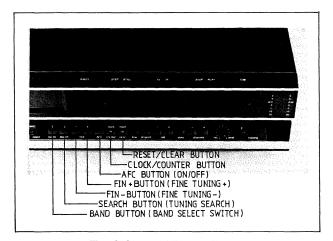


Fig. 2 Channel Preset Button

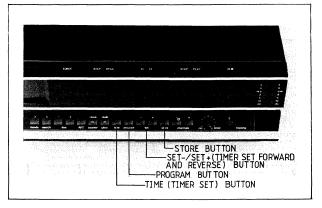
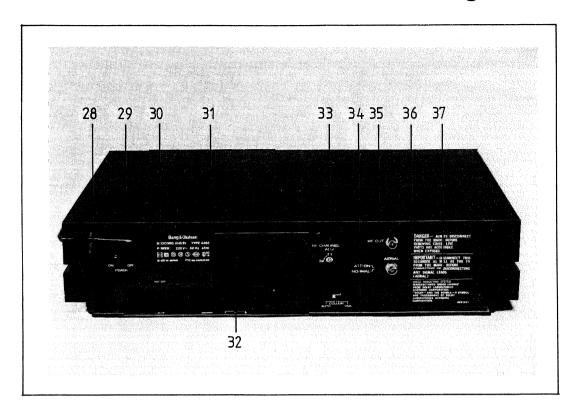


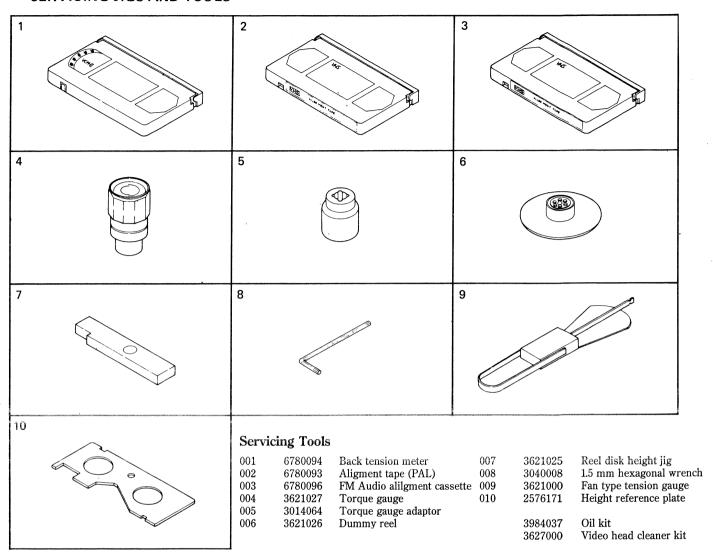
Fig. 3 Timer Set Button

- 17. Dolby NR SWITCH
- 18. HiFi /NORMAL SWITCH
- 19. LCH-STEREO-RCH SELECT SWITCH
- 20. normal-select (TUNING) SWITCH
- 21. CHANNEL PRESET BUTTON
- 22. TIMER SET BUTTON
- 23. Channels (CHANNEL DOWN) BUTTON
- 24. Channels + (CHANNEL UP) BUTTON
- 25. rec level CONTROL
- 26. tracking CONTROL
- 27. LEVEL INDICATOR



- 28. MAINS POWER SWITCH
- 29. MAINS LEAD
- 30. PERI CONNECTOR (21 PIN)
- 31. DIN JACK (7 PIN)
- 32. REMOCON SELECTOR SWITCH (1-2-3)
- 33. RF CHANNEL ADJ.
- 34. ATTENUATTER SWITCH (ATT ON)
- 35. AUTO/COLOUR/TSG SWITCH
- 36. RF OUTPUT SWITCH
- 37. AERIAL INPUT SOCKET

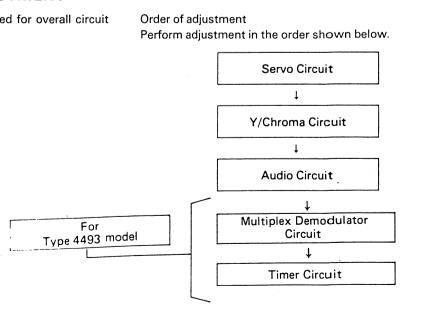
SERVICING JIGS AND TOOLS



ELECTRIC CIRCUIT ADJUSTMENT

Test equipment, jigs and tapes required for overall circuit adjustment.

- 1) Color TV set
- 2) Oscilloscope
- 3) VTVM
- 4) Color bar signal generator
- 5) Frequency counter
- 6) DC voltmeter
- 7) Alignment tape
- 8) Blank tape



1. REMOVING THE CASE

1. Side panel L, R (Fig. 5)

1) Pull the side panels in the directions of the arrows to release the fittings with the top cover and remove the left and right side panels.

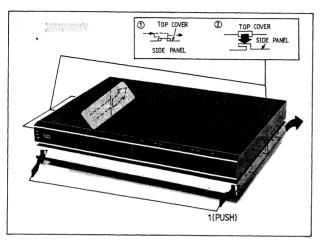


Fig 5. Side Panel L, R

2. Top cover (Fig. 6)

- 1) Remove the side panels L, R (Item 1).
- 2) Remove 5 screws (2-1, 2-2).

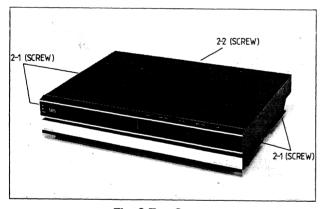


Fig. 6 Top Cover

3. Bottom cover (Fig. 7)

1. Remove 6 screws (3).

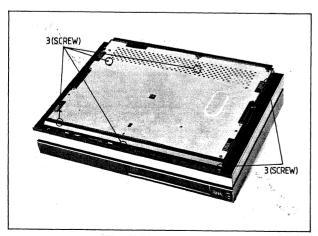


Fig. 7 Bottom Cover

4. Front panel (Fig. 8)

- 1) Remove 3 screws (4-1).
- 2) Open 3 fittings (4-2) with the frame upward to remove the front panel in the direction of the arrow.

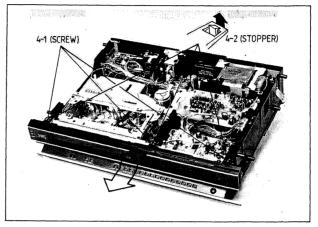


Fig. 8 Front Panel

5. Control block door (Figs. 9, 10)

- 1) Remove side panels L. R (Item 1).
- 2) Remove the top cover (Item 2).
- 3) Remove the front panel (Item 4).
- 4) Release the fitting between the shaft and damper on the right of the control block door by pulling it in the direction of arrow (a) (5-4).
- 5) Apply static force P to the tip of the control block door to turn the door centering around pivot B and release the fitting between the door and frame to remove the door (5-5).
- When reinstalling the control block door.
- A) Align the fitting between the control block door and frame by pressing the door in the direction of arrow ©. (5-A)
- B) Check that the door gear and damper gear are engaged with each other, then fit the control block door shaft and damper by turning the door in the direction of arrow ①. (5-B).

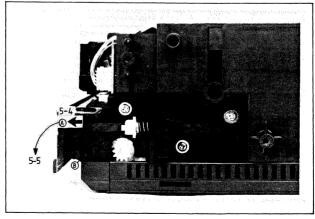


Fig. 9 Control Block Door

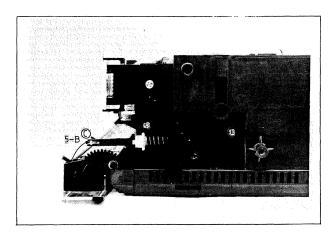


Fig. 10 Control Block Door

- 6. Damper Assembly (Fig. 11)
- 1) Remove the side panel L, R (Item 1).
- 2) Remove the top cover (Item 2).
- 3) Remove the Front panel (Item 4).
- 4) Remove 3 screws (6).

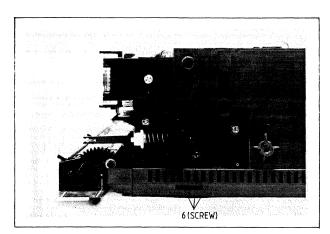


Fig. 11 Damper Assembly

2. PC BOARD LOCATIONS

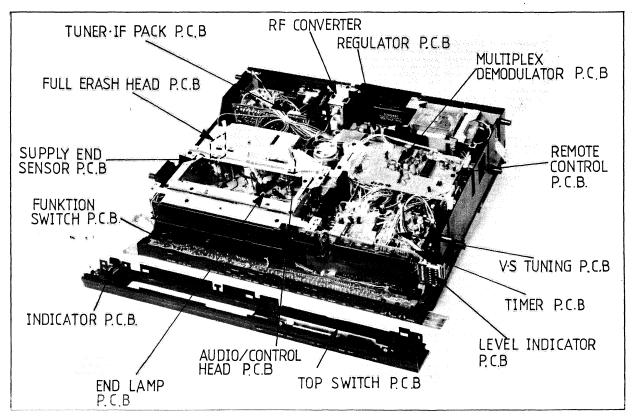


Fig. 17 Top View of PC Location Board

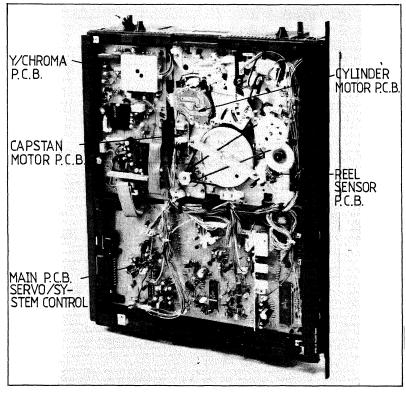


Fig. 18 Bottom View of PC Board Location

3. REMOVING THE PC BOARDS

1. Top Switch P. C. Board (Figs. 19.20)

- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove the front panel (Item 1-4).
- 4) Remove 2 top switch board bracket fixing screws (7-1). (See Fig. 19).
- 5) Taking care of the operation buttons, pull out the top switch board upward (7-2). (See Fig. 20).

2. Indicator P. C. Board (Fig. 20)

- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove the front panel (Item 1-3).
- 4) Release 3 stoppers (8) and remove the indicator board.

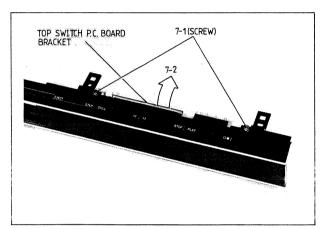


Fig. 19 Top Switch P.C. Board

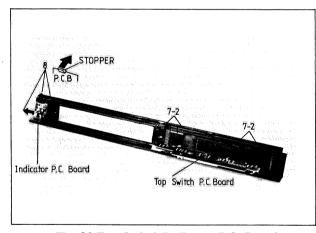


Fig. 20 Top Switch/Indicator P.C. Board

3. Function Switch P. C. Board (Fig. 21)

- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove the front panel (Item 1-4).
- 4) Remove the control block door (Item 1-5).
- 5) Remove 3 function switch board fixing screws (9-1).
- 5) Taking care of the fitting sections between the tuning select slide knob/input select knob/tracking control knob and the function switch board, slide the board in the direction of arrow (9-2) to remove it.

- When reinstalling the Function Switch P. C. Board
- A) Reinstall the board, taking care of the tuning select slide knob/input select knob/tracking control knob and the control rod positions of each switch on the function switch board.
- B) Follow the reverse procedure to removal except for the above.

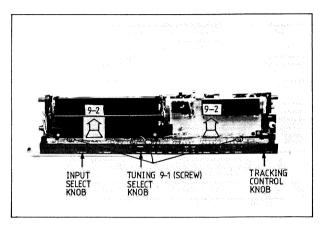


Fig. 21 Function Switch P.C. Board

5. Timer P. C. Board (Figs. 13,14)

- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove the front panel (Item 1-2).
- 4) Remove the control block door (Item 1-5).
- 5) Remove 4 timer board fixing screws (10-1).
- 6) Release the wires from 2 wire retainers (10-2) and disconnect the connector from the function switch board.
- 7) Disconnect connector (10-3).
- 8) Pull out 2 flat cables by depressing the connector covers shown in Fig. A.(10-4) When reconnecting the flat cables, align the wires of the flat cables and insert the cables while depressing the connector covers.

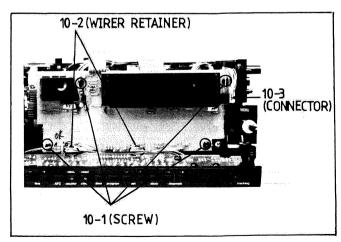


Fig. 22 Timer P.C. Board

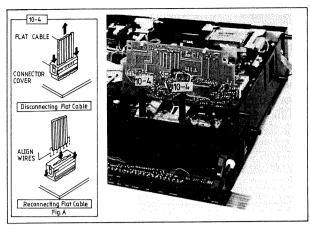


Fig. 23 Timer P.C. Board/Flat Cable



- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove the front panel (Item 1-4).
- 4) Remove 2 V-S tuning board fixing screws (11-1).
- 5) Push to open 2 stoppers and remove the V·S tuning board.
- 6) When replacing the board, disconnect 2 connectors and flat cable (11-3).
 - * Refer to item 5 Timer P. C. Board Removal for disconnecting the flat cable.

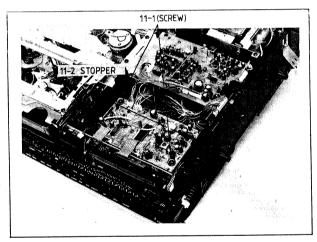


Fig. 24 V · S. Tuning P.C. Board

7. Audio P. C. Board (Fig. 25)

- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove the rubber cap from the frame (12-1).
- 4) Remove the audio board fixing screw (12-2) and turn the board in the direction of the arrow (12-3) to check the pattern side.
- 5) When replacing the board, further remove 2 board holder fixing screws (12-47 and disconnect 5 connectors (12-5) remove the board.

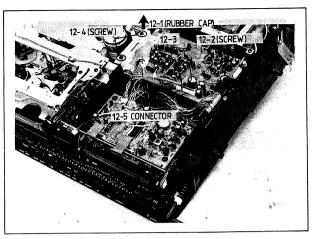


Fig. 25 Audio P.C. Board

- 8. Regulator P. C. Board (Fig. 26)
- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove 4 regulator board fixing screws (13-1).
- 4) Lift up the power frame assembled with the AC outlet, transformer and regulator board (13-2) to remove the frame.

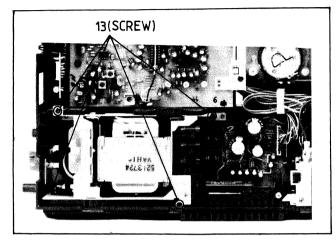


Fig. 26 Regulator P.C. Board

9. RF Converter (Fig. 27)

- 1) Remove side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Remove RF converter support plate fixing screw (14-1).
- 4) Push stopper (14-2) and pull out the RF converter in the direction of arrow (14-3).

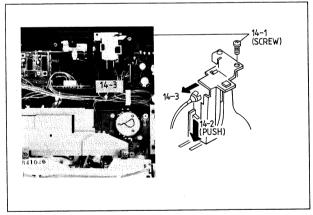


Fig. 27 RF Converter

10. Tuner/IF pack P. C. Board (Fig. 28)

- 1) Remove the side panels L, R (Item 1-1).
- 2) Remove the top cover (Item 1-2).
- 3) Disconnest 2 connectors (15-1).
- 4) Remove 4 screws (15-2).
 - * Assemble the tuner/If pack board by the reverse procedure to removal.

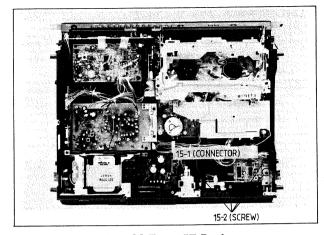


Fig. 28 Tuner/IF Pack

- 11. Y/Chroma P. C. Board (Figs. 29, 30)
- 1) Remove the bottom cover (Item 1-3).
- 2) Disconnect 2 connectors (16-1).
- 3) Remove 2 screws (16-2).
- 4) Pull out 2 flat cables by depressing connector covers (16-3) shown in Fig. 20. When reconnecting the flat cables, align the wires and insert the cables while depressing the connector covers.

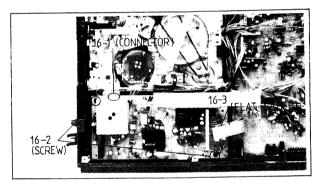


Fig. 29 Y/Chroma P.C. Board

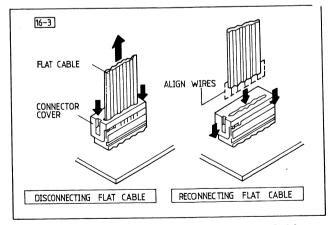


Fig. 30 Disconnecting/Reconnecting Flat Cable

5-7

Bang&Olufsen

12. Main P. C. Board (Fig. 31)

- 1) Remove the bottom cover (Item 1-3).
- 2) Remove 6 main board fixing screws (17-1) and push to open 2 stoppers (17-2) to remove the main board in the direction of the arrow.
- 3) When replacing the board, further disconnect 2 flat cables (17-3) from the Y/Chroma board and 15 connectors (17-4) to remove the board.

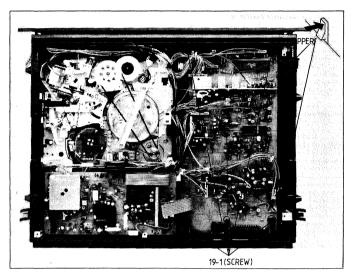


Fig. 31 Main P.C. Board

4. CASSETTE LOADING MECHANISM PARTS LOCATIONS

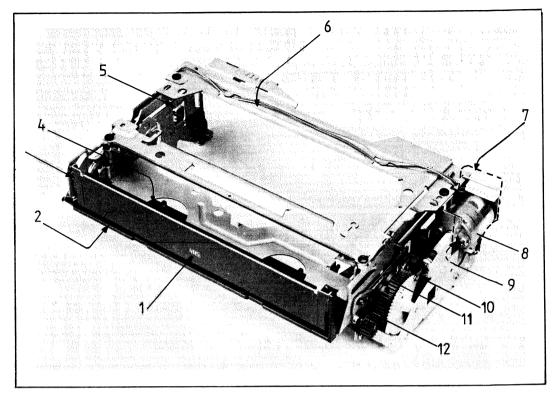


Fig. 32 Cassette Loading Mechanism

- 1. CASSETTE DOOR
- 2. FRONT HOLDER
- 3. DOOR ARM
- 4. CASSETTE HOLDER ASSEMBLY
- 5. SUPPLY END SENSOR BOARD
- 6. CHASSIS HOLDER

- 7. CASSETTE LOADING MOTOR BOARD
- 8. CASSETTE IN SWITCH
- 9. CASSETTE UP SWITCH
- 10. DRIVE GEAR
- 11. CLUTH GEAR
- 12. SYNCHRO GEAR

5. REMOVING THE CASSETTE LOADING MECHANISM PARTS

1. Cassette Loading Mechanism (Figs. 33)

- 1) Remove 3 screws, and take out the shield cover.
- 2) Slide the reinforcing plate in the direction of the arrow to remove it and then disconnect connector.
- 3) Remove 2 screws and then remove the whole cassette loading mechanism after lifting its rear.

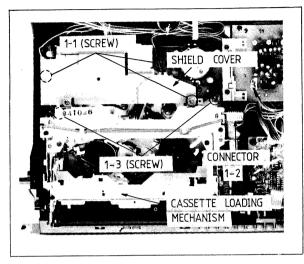


Fig. 33 Cassette Loading Mechanism

2. Chassis Holder (Fig. 34)

1) Remove 4 chassis holder fixing screws. (2)

3. Cassette Door (Fig. 34)

1) Push the top right of the front holder to the right to release its fitting with the front holder. (3)

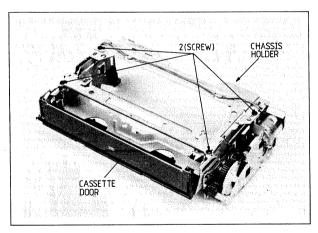


Fig. 34 Chassis Holder/Cassette Door

4. Supply End Sensor P. C. Board (Fig. 35)

1) Release the stopper. (4)

* The supply end sensor board can be removed without removing the cassette loading mechanism. The takeup end sensor is made in one unit with the cassette loading board, so refer to item 8.

5. Door Arm (Fig. 35)

1) Remove the spring and then release its 2 fitting positions with the frame. (5)

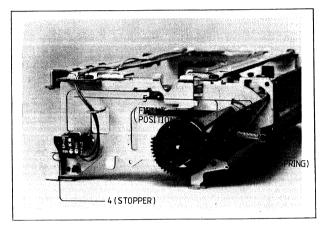


Fig. 35 Supply End Sensor Board/Door Arm

6. Front Holder (Fig. 38)

- 1) Remove the cassette loading motor block assembly. (Refer to item 4-7.)
- 2) Remove the chassis holder/cassette door. (Refer to items 4-2, 4-3)
- 3) Remove 2 front holder fixing screws. (6)

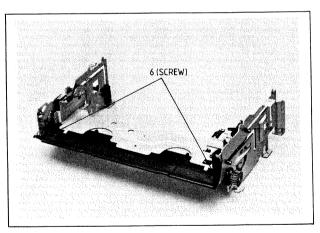


Fig. 36 Front Holder

7. Cassette Loading Motor Block Assembly (Fig. 37)

1) Remove 2 cassette loading motor block assembly fixing screws. (7)

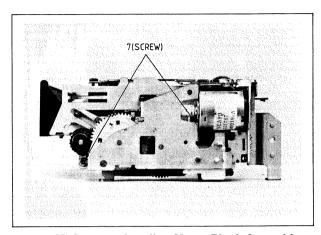


Fig. 37 Cassette Loading Motor Block Assembly

- 8. Cassette Loading Motor (Fig. 38)
- 1) Remove 2 cassette loading motor fixing screws.
- 9. Switch Lever (Fig. 38)
- 1) Remove 2 springs and pull out the switch lever in the direction of the arrow.
- 10. Cluth Gear (Fig. 38)
- 1) Pull out the clutch gear in the direction of the arrow.

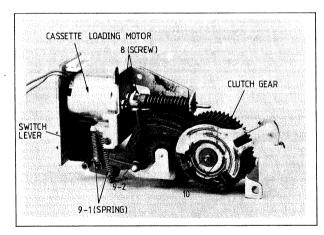


Fig. 38 Cassette Loading Motor/Switch Lever/Cluth Gear

Note: Check the following items when reasembling the cassette loading motor block assembly.

- (1) Check that the switch lever is securely inserted into the groove in the clutch gear.
- (2) Check that the markings (mark > and hole ○) of the cluth gear and drive gear match.

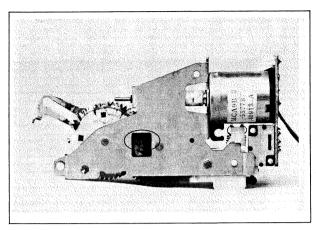


Fig. 39 Gear Marking (I)

Note: Check the following items when reasembling the cassette loading machanism.

- (1) Check that the left and right of the cassette holder are securely inserted into the holder drive arms. (Figs. 40, 41)
- (2) Check that markings of the left and right synchro gears and clutch gears match. (Figs. 40, 41)

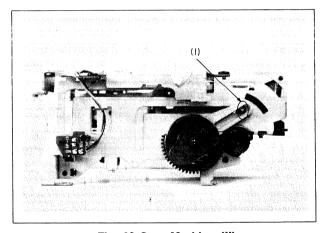


Fig. 40 Gear Marking (II)

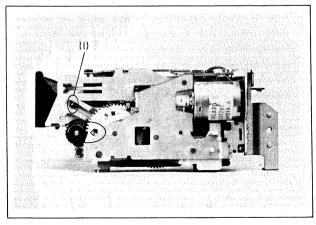


Fig. 41 Gear Marking (III)

6. MAIN MECHANICAL COMPONENTS LOCATIONS

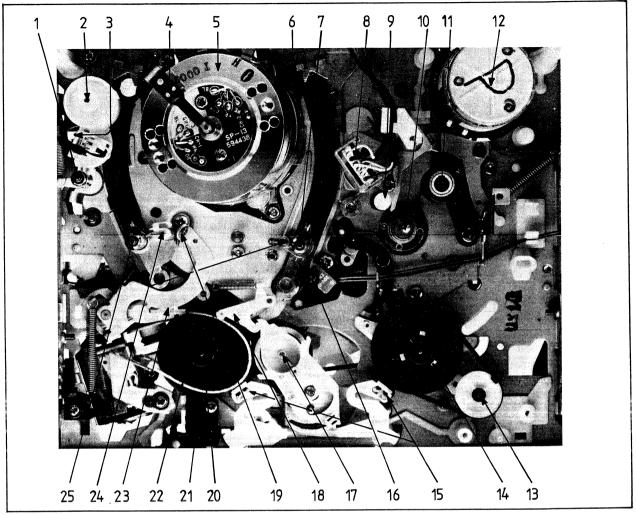
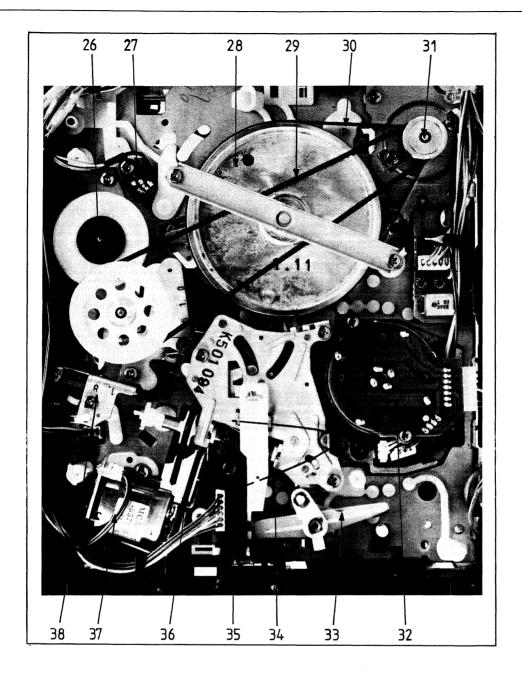


Fig. 42 Top View

- 1. SUPPLY GUIDE POLE
- 2. IMPEDANCE ROLLER
- 3. FULL ERASE HEAD
- 4. CYLINDER MOTOR BRUSH
- 5. UPPER CYLINDER
- 6. CATCHER/CYLINDER BASE
- 7. TAKE-UP GUIDE ROLLER
- 8. AUDIO/CONTROL HEAD
- 9. TAKE-UP GUIDE POLE
- 10. CAPSTAN SHAFT
- 11. PRESSURE ROLLER
- 12. CAPSTAN MOTOR
- 13. LOAD PULLEY

- 14. TAKE-UP REEL DISK
- 15. MAIN BRAKES
- 16. END LAMP
- 17. REEL DRIVE IDLER
- 18. SUB BRAKE
- 19. TENSION POLE
- 20. SUPPLY REEL DISK
- 21. SAFETY TAB SWITCH
- 22. TENSION BAND
- 23. TENSION ARM
- 24. ANGLE POSTS
- 25. SUPPLY GUIDE ROLLER



- 26. CLUTCH PLATE ASSEMBLY
- 27. REEL SENSOR
- 28. CAPSTAN FLYWHEEL
- 29. REEL BELT
- 30. CAPSTAN BELT
- 31. CAPSTAN MOTOR PULLEY
- 32. LOWER CYLINDER
- 33. TENSION RELEASE ARM
- 34. LOADING GEAR ASSEMBLY
- 35. MECHANISM STATE SWITCH
- 36. LOADING BELTS
- 37. LOADING MOTOR
- 38. BRAKE SLIDER

7. BEFORE DISASSEMBLING PARTS

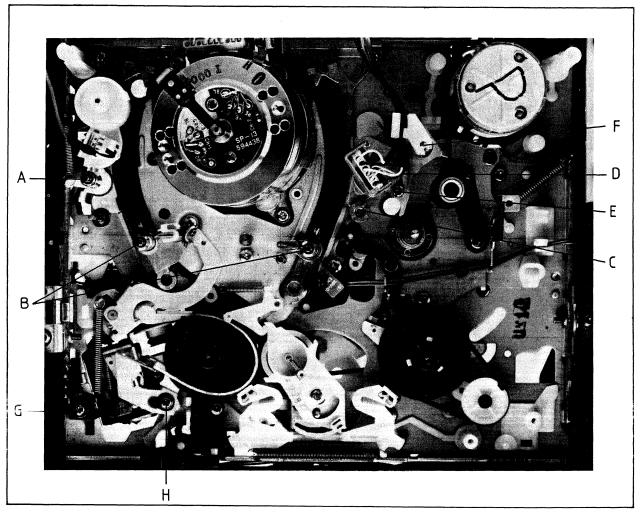


Fig. 44 Before Disassembling Parts

The parts shown below are fixed in the factory using precision jigs so be sure not to loosen their or remove them.

A Take-up/supply guide height adjusting nut.
B Supply guide roller height adjusting nut.
C AC head X value adjusting screw.

- (D) AC head tilt adjusting screw.
- © AC head azimuth adjusting screw.
- ® AC head height adjusting nut.
- Back tension adjusting spring holder fixing screw.
- Tension band fixing screw.

8. REMOVING THE MAIN ELECTRICAL PARTS

- 1. Cylinder Assembly
- 2. Full Erase Head
- 3. Audio Control Head

1. Video Head (Fig. 45)

- 1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
- 2) Remove the screw to remove the board holder.
- 3) Remove the screw to remove the cylinder motor brush.
- 4) Remove two connectors of the video head P.C.B. and three connectors under the cylinder.
- 5) Remove the connector from the cylinder P. C. B.
- Remove cylinder assembly to remove three cylinder assembly fixing screws.
- * Be careful that your fingers or tools do not touch the video head tips during work. Install the cylinder assembly by the reverse procedure. Adjust as follows after installing.
- Cylinder Speed Assist Adjustment
- Head Switching Point Adjustment
- Tracking Preset Adjustment
- Record Luminance and Chroma Level Adjustments

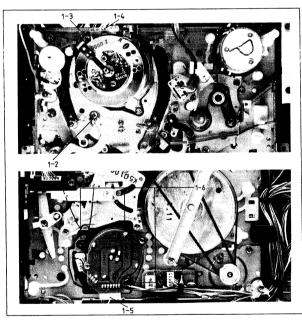


Fig. 45 Cylinder Assembly

2. Full Erase Head [FE Head] (Fig. 46)

- 1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
- Remove the spring between the FE head base and the chassis.
- 3) Remove the guide pole fixing nut to take out the guide pole, spring and washer.
- 4) Take out the FE head base and then remove the FE head fixing screw at the back of the base.
- * Install the full erase head by the reverse procedure.

 Adjust the guide pole height after installation.

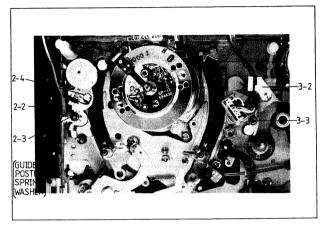


Fig. 46 FE Head, A/C Head

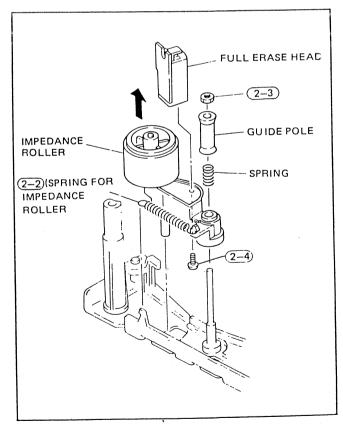


Fig. 47 Full Erase Head

- 3. Audio/Control Head Removal [AC Head] (Figs. 32, 34, 35)
 - 1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
 - 2) Remove the cord clamp.
 - 3) Remove the A/C head fixing nut and washer to take out the A/C head assembly.
 - * Install the audio/control head by the reverse procedure. Fit the bottom of the spring under A/C head base to the chassis and the top to the stopper on the base. Check that the tip of the head base fixing screw is approx. 3 4 mm above the top of the base after installing the A/C head assembly and then adjust as follows.
 - A/C Head Height Adjustment
 - A/C Head Tilt Adjustment
 - A/C Head Azimuth Adjustment
 - A/C Head Position Adjustment

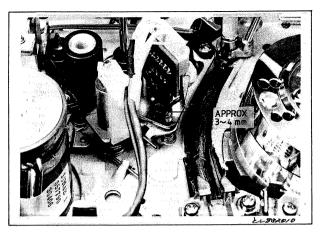


Fig. 49 Audio/Control Head

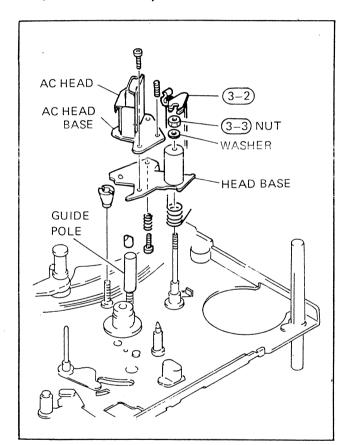


Fig. 48 Audio/Control Head

9. REMOVING THE MAIN MECHANICAL PARTS

- 1. Cylinder Motor
- 2. Loading Motor
- 3. Capstan Motor
- 4. Supply and Take-up Main Brakes
- 5. Sub Brake
- 6. Tension Band and Tension Arm
- 7. Supply Reel Disk
- 8. Take-up Reel Disk
- 9. Load Pulley
- 10. Reel Drive Idler
- 11. Safety Tab Switch
- 12. End Lamp
- 13. Pressure Roller
- 14. Pressure Roller Arm Bracket
- 15. Clutch Plate Assembly
- 16. Brake Slider
- 17. Capstan Flywheel
- 18. Mechanism State Switch
- 19. Reel Sensor
- 20. Supply and Take-up Loading Arms
- 21. Loading Gear Assembly

1. Cylinder Motor

1) Remove the system control PC Board while referring to "System Control PC Board Removal".

[Cylinder Motor PC Board] (Fig. 50)

- 2) Remove the cylinder motor PC Board fixing screw.
- Turn the board clockwise to release it fitting with the motor case.

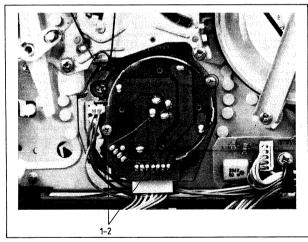


Fig. 50 Cylinder Motor PC Board

[Cylinder FG PC Board] (Figs. 51, 52)

- 4) Remove the motor case fixing screw.
- 5) Turn the case clockwise, release the fitting with the cylinder and remove the case.
- 6) Remove 2 rotor magnet fixing screws to remove the rotor magnet. Do not allow the rotary magnet to be attracted by other magnetic or iron materials because it is magnetized with high precision to maintain the precise rotation of the motor. When it is attracted by mistake, there is danger that its magnetization may be changed. Pay special attention in handling the FG signal generating magnet installed on the back of the rotary magnet because it has 60 poles and their magnetic force is weak.
- 7) Remove 3 cylinder FG board fixing screws.
- * Install the cylinder motor by the reverse procedure.

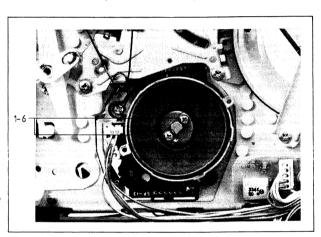


Fig. 51 Cylinder Motor (Rotor Magnet)

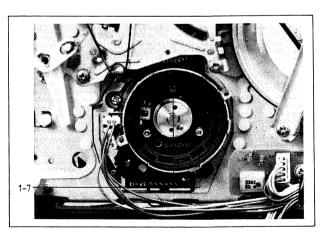


Fig. 52 Cylinger Motor (Cylinder FG PC Board)

2. Loading Motor (Fig. 53)

- Remove the system control PC Board while referring to "System Control PC Board Removal".
- 2) Remove the loading belt.
- 3) Remove the loading motor fixing screw.
- * Fit the groove in the chassis and the stopper on the bracket to install the loading motor and then fix it using screws.

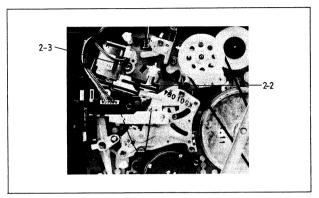


Fig. 53 Loading Motor

3. Capstan Motor (Fig. 54)

- 1) Remove the system control PC Board while referring to "System Control PC Board Removal".
- 2) Remove the reel belt.
- 3) Remove the flywheel belt.
- 4) Remove 2 capstan motor bracket fixing screws.
- * Install the capstan motor by the reverse procedure. Confirm the reference oscillation frequency Adjustment after installation.

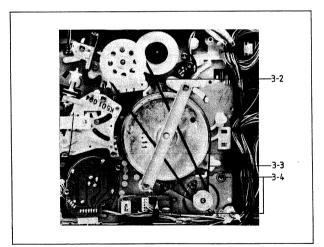


Fig. 54 Capstan Motor

4. Supply and Take-up Main Brakes (Fig. 55)

- Remove the springs between the supply brakes and take-up brakes.
- 2) Release the fitting with the chassis.

5. Sub Brake (Fig. 55)

- 1) Remove the spring between the sub chassis and brake.
- 2) Release the fitting with the brake shaft.

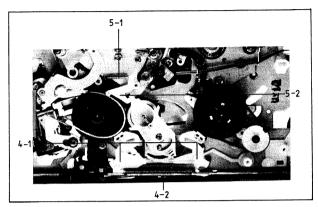


Fig. 55 Main and Sub Brakes

6. Tension Band and Tension Arm (Fig. 56)

- 1) Remove the springs between the tension arm and spring holder.
- 2) Remove the tension band fixing screw.
- 3) Release the fitting with the tension arm to pull out the tension band and the tension arm.
- * Install the tension band and tension arm by the reverse procedure.
- Adjust as follows after installation.
- Tension Arm Position Adjustment
- Back Tension Adjustment

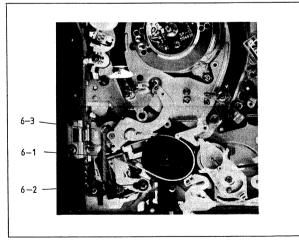


Fig. 56 Tension Band and Tension Arm

7. Supply Reel Disk (Fig. 57)

- 1) Remove the tension arm and tension band. (See Item 6.)
- 2) Remove the sub brake. (See Item 5.)
- 3) Remove the washer at the top of the reel disk.
- * The bearing and spacer are inserted between the reel disk and chassis. Check them before installing the supply reel disk.
- * Use new retaining washer for reel disk when reinstalling.

8. Take-up Reel Disk (Fig. 57)

- Remove the belt between the reel disk and the load pulley.
- 2) Remove the washer at the top of the reel disk.
- * The spacer is inserted between the reel disk and the chassis. Check it before installing the take-up reel disk.
- * Use new retaining washer for reel disk when reinstalling.

9. Loading Pulley (Fig. 57)

- 1) Remove the belt between the load pulley and the reel disk
- 2) Remove the washer at the top of the load pulley.
- Use new retaining washer for load pulley when reinstalling.

10. Reel Drive Idler (Fig. 57)

1) Pull the spring holder toward you to release its fitting with the reel drive idler arm shaft and then pull out the idler upward.

11. Safety Tab Switch (Fig. 57)

- Remove the system control PC Board while referring to "System Control PC Board Removal".
- 2) Disconnect connector (3P) from safety tab switch.
- 3) Remove the safety tab switch fixing screw.

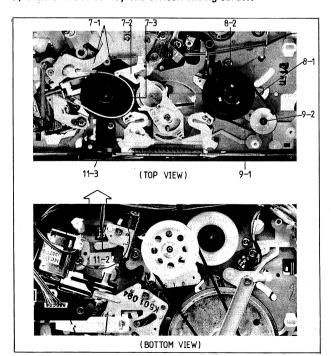


Fig. 57 Reel Tables, Load Pulley, Reel Driver Idler Safety Tab Switch

12. End Lamp (Fig. 58)

- 1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
- 2) Remove the end lamp fixing screw.

13. Pressure Roller Removal (Fig. 58)

- 1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
- 2) Remove the pressure roller fixing screw.
- * Install the pressure roller with the plastic inside of the pressure roller upward.

Check the pressure roller compression strength after installation.

14. Pressure Roller Arm Bracket (Fig. 58)

- 1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
- 2) Remove the take-up reel disk. (See Item 8)
- 3) Remove the washer inserted to the pressure roller arm shaft and then remove the pressure roller arm.
- 4) Remove the cords from the wire tie on the bracket.
- 5) Remove 2 bracket fixing screws.
- * Install the pressure roller arm bracket by the reverse procedure while taking care of the following.

Insert the take-up brake drive arm pin into the hold in the take-up brake operation arm.

Insert the pressure roller drive arm pin into the hole in the pressure roller operation arm.

Insert the pressure roller operation link pin into the hole in the pressure roller arm.

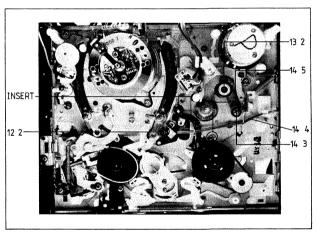


Fig. 58 End Lamp, Pressure Roller,
Pressure Roller Arm Bracket

5-19

15. Clutch Plate Assembly (Fig. 59)

- 1) Remove the reel drive idler. (See Item 10.)
- 2) Remove the system control PC Board while referring to "System Control PC Board Removal".
- 3) Remove the reel belt.
- 4) Remove 2 clutch plate assembly fixing screws.
- * Install the clutch plate assembly by the reverse procedure

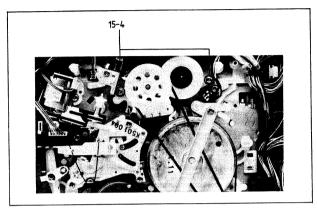


Fig. 59 Cluth Platet Assembly

16. Brake Slider (Fig. 60)

- 1) Remove the reel drive idler. (See Item 10.)
- Remove the system control PC Board while referring to "System Control PC Board Removal".
- 3) Remove the clutch plate. (See Item 15.)
- 4) Remove the brake slide fixing screw.
- * Insert the brake drive arm pin into the groove of the slider operation section to install the brake slider.

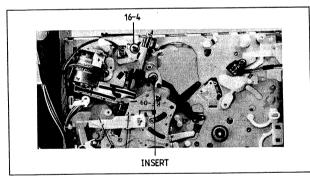


Fig. 60 Brake Slider

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17. Capstan Flywheel (Fig. 61)

- 1) Remove the system control PC Board while referring to "System Control PC Board Removal".
- 2) Remove 2 flywheel bracket fixing screws to remove the flywheel support plate.
- 3) Remove the reel belt and flywheel belt.
- 4) Pull out the flywheel while taking care of the oil shield washer on the capstan shaft.
- * Insert the capstan flywheel by the reverse procedure.

 A washer is inserted on the flywheel of the capstan shaft.

Confirm the reference oscillation frequency adjustment after installation.

Check it before installation.

18. Mechanism State Switch (Fig. 61)

- 1) Remove the system control PC Board while referring to "System Control PC Board Removal".
- Remove the mechanism state switch fixing screw and lift the screw hole side to release the fitting with the chassis.
- * Fit the switch lever to the groove in the slider to screw the lever when installing the switch.

 Adjust the mechanism state switch after installation.

19. Reel Sensor (Fig. 61)

- 1) Remove the system control PC Board while referring to "System Control PC Board Removal".
- 2) Remove the reel sensor PC Board fixing screw.

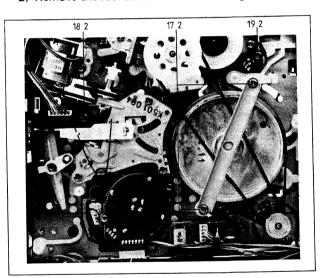


Fig. 61 Capstan Flywheel, Mechanism State Switch Reel Sensor

20. Supply and Take-up Loading Arms (Fig. 62)

- 1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
- 2) Remove the tension band and tension arm. (See Item 6.)
- 3) Remove the sub brake. (See Item 5.)
- 4) Remove 3 sub chassis fixing screws and remove the sub chassis, guide pole and inclined guide together with the base.
- * Install the supply and take-up loading arms by the reverse procedure fit the loading gear stopper and loading arm groove when installing the loading.

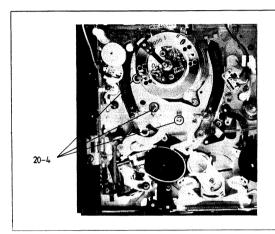


Fig. 62 Supply and Take-up Loading Arms

21. Loading Gear Assembly (Figs. 63, 64)

- 1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
- 2) Remove the reel drive idler. (See Item 10.)
- 3) Remove 2 screws on the sub chassis.
- 4) Remove the system control PC Board while referring to "System Control PC Board Removal".
- 5) Remove the capstan flywheel. (See Item 17.)
- 6) Remove the clutch plate. (See Item 15.)
- 7) Remove the brake slider. (See Item 16.)
- 8) Remove the mechanism state switch. (See Item 18.)
- 9) Remove the spring from the loading gear assembly.
- 10) Release the fitting with the loading gear assembly to remove the switch slider.

- 11) Release the fitting between the tension release arm and the chassis to remove the tension release arm.
- 12) Remove the loading belt.
- 13) Remove 3 loading gear assembly fixing screws.
- * Install the loading gear assembly in the reverse procedure while paying attention to the following.
- Insert the take-up brake drive arm pin into the hole in the take-up brake operation arm.
- Insert the pressure roller drive arm pin into the hole in the pressure roller operation arm.

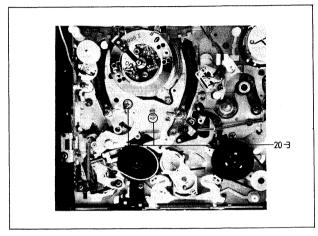


Fig. 63 Loading Gear Assembly

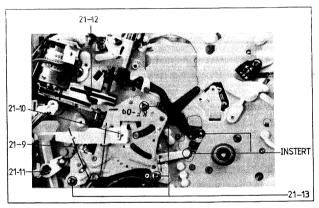


Fig. 64 Loading Gear Assembly

1. SERVO CIRCUIT ADJUSTMENT

Remove the bottom cover, place the VTR with the left down and perform the adjustment by the following procedure.

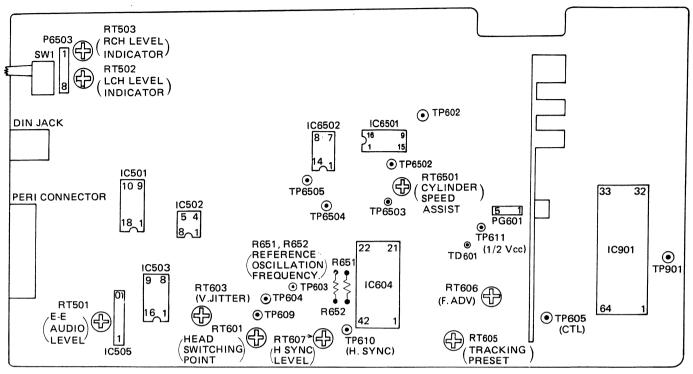


Fig. 1 Servo/System Control (Main) P.C. Board (Parts Side)

1. Cylinder Speed Assist Adjustment: RT6501

This adjustment reduces horizontal jitter on the screen in play mode.

- Connect the colour bar signal generator to the peri connector (video input) on the rear panel or receive a TV program.
- 2) Connect the channel-1 of the oscilloscope to the TP6503 and channel-2 to TP6504.
- 3) Short-circuit test point terminals the TP601 and TP6505 on the P.C. Board.
- 4) Load a blank tape and record mode.
- 5) Set the AC/GND/DC select switch of the oscilloscope to "GND" and align the ground lines of the channels 1 and 2.
- 6) Set the AC/GND/DC select switch of the oscilloscope to "DC" and adjust the RT6501 (Cylinder speed control) to equalize the voltages of channels 1 and 2.

Note: Set the probe to 10: 1 for use.

2. Reference Oscillation Frequency Adjustment: R651. R652

This adjustment fine tunes the reference oscillation frequency (REF 25 Hz) in the phase control system to correct the rotation transmission loss caused by uneveness of the diameters of the flywheel and puliey, etc. When this adjustment is incomplete, noise appears in the picture or correct tracking is not achieved.

- 1) Connect the frequency counter to the peri connector (audio output) on the rear panel.
- Short-circuit test point terminals TP601 and TP609 to place only the phase control system (IC604) in the record mode.
- 3) Play back the alignment tape. (3 kHz AUDIO)
- 4) Check that the reading of the frequency counter is 3000 Hz ± 15 Hz. When it is more than 3015 Hz, omit R651. On the other hand, when it is less than 2985 Hz, omit R652.

Note: There are some units with R651 or R652 omitted on shipment from the factory.

3. Head Switching Point Adjustment: RT601

This adjustment determines the switching point of the video head during playback. When this adjustment is incomplete, the FM signal is degraded and the switching noise appears in the picture or H/V jitter is generated.

- Connect channel-1 of the oscilloscope to test point terminals TP603 (SW25Hz output) and TP216 (GND) on the Y/Chroma P.C. Board, and channel-2 to the peri connector (video output) on the rear panel.
- 2) Connect the monitor TV to the RF OUT jack on the rear panel.
- 3) Play back the alignment tape.
- 4) Set the sync slope switch of the oscilloscope to "-" to adjust the CH1 phase. Then adjust RT601 so that the trailing edge of the SW25Hz signal is $6.5H \pm 0.5H$ before the vertical sync in the video signal.

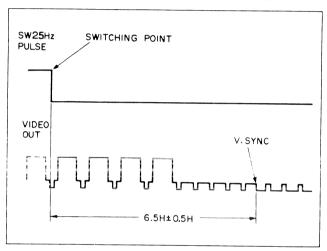


Fig. 2 Head Switching Point

4. Tracking Preset Adjustment: RT605

This adjustment optimizes tracking when playing back tape recorded on this VTR. When this adjustment is incomplete, noise is conspicuous in the played back picture with the tracking control set to the center click position or noise may not be removed with the tracking control slided.

- Connect the colour bar signal generator to the peri connector (video input) on the rear panel or recieve a TV program.
- 2) Connect channel-1 of the oscilloscope to the TP603 (SW25Hz) and channel-2 to TP605 (CTL).
- Set tracking control RV121 to the click position, and record for a few minutes. Then play back this section.
- 4) Trigger channel-1 of thε oscilloscope.
- Adjust RT605 so that the CTL pulse peak is delayed from the SW25Hz synchro phase by 0.5m sec ±0.1m sec.
- 6) Observe the monitor picture, and the tracking control (RV121) left and right centered on the click position and check that the S/N is optimum at the click position.

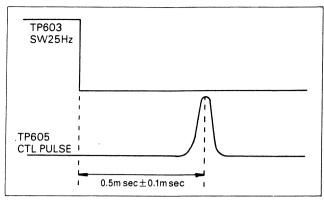


Fig. 3 Tracking Preset

5. H. Sync Level Adjustment: RT607

This adjustment sets the H. sync level to the specified value.

- 1) Connect channel-1 of the oscilloscope to the TP610 (1/2 Vcc) and channel-2 to the TP611 (SYNC).
 - * Note: Set the CH-1 and CH-2 gain positions of the oscilloscope to 50 mV/div. and align the GND levels.
 - ° Set the probe of the oscilloscope to 10:1.
- 2) Play back the alignment tape.
- 3) Adjust RT607 so that the DC level of H. Sync is 100 $\pm 50\,\mathrm{mV}$ higher than that of 1/2 Vcc shown in Fig. 4.

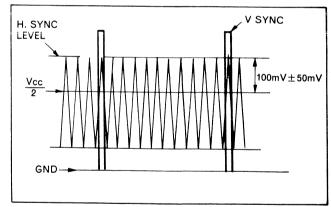


Fig. 4 H. Sync Level

6. Frame Advance Adjustment: RT606

This adjustment regulates advancing of the pictures in the frame advance mode.

- Connect the monitor TV to the RF OUT Jack on the rear panel.
- 2) Connect the Oscilloscope to the TP605
- Playback the alignment tape and set the unit to the play pause mode.
- 4) Adjust RT606 so that 15~20 frames advance every 10 sec when the STEP (Frame Advance) key on the remote control is held down.

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7. V. Jitter Adjustment: RT603

This adjustment eliminates vartical jitter and noise in the still picture.

- Connect the colour bar signal generator to the peri connector (video input) on the rear panel or receive a TV program.
- 2) Connect the monitor TV to the RF OUT jack on the rear panel.
- 3) Record for a few minutes. Playback the recorded signal in the still mode.
- 4) Adjust RT603 while observing the monitor TV so that vertical jitter in the picture stops.

8. Level Indicator Adjustments: RT502, RT503

These adjustments set the level meter indications. If these adjustments are incomplete, the Lch input level is not the same as the Rch input level.

- 1) Set the input select switch on the front of the VTR to "EXTERN" (DIN input) and the Lch -- Rch select switch to the "L + R" position.
- 2) Connect the oscillator to the Lch Rch audio input DIN jack and supply a 50mVrms, 1kHz signal.
- 3) Set the RECORD VOLUME control to MAX.
- 4) Adjust RT502 (L-CH LEVEL INDICATOR) to light the level indicator from the lowest segment in sequence and stop turning RT502 when one red LED (0 dBm indicator) lights.
- 5) Adjust RT503 (R-CH LEVEL INDICATOR) to light the level indicator from the lowest segment in sequence and stop turning RT503 when one red LED (0 dBm indicator) lights.
- 6) Load the VTR with a blank tape and record the 50mVrms, 1kHz signal.
- 7) Rewind the recorded tape and play it back. Check that on red LED (0 dBm indicator) lights for each channel. If it does not, readjust the level indicator for both L and R channels.

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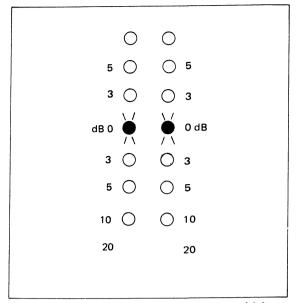


Fig. 6 Level Indicator ... 0dB Indicator Light;

2. Y/CHROMA CIRCUIT ADJUSTMENT

Removing the bottom cover, place the VTR with the left down and perform the adjustment by the following procedure.

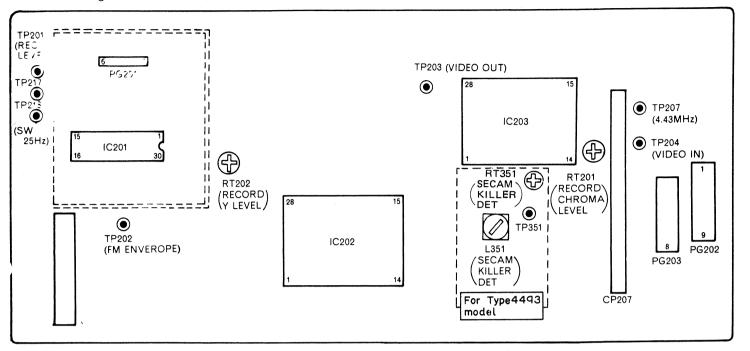


Fig. 7 Y/Chroma P.C. Board (Parts Side)

1. Record Chroma Level Adjustment: RT201

This adjustment optimizes the chroma level during recording.

When this adjustment is incomplete and the level is too high, diamond beats can be seen in the picture, and when the level is too low, the chroma S/N ratio deteriorates and coloring becomes poor. The optimum record chroma level differs depending on the figure stamped on the section shown on the upper cylinder (video head).

Perform this adjustment when replacing the video heads and the parts in the Y/Chroma signal system.

Connecting test equipment

- 1) Connect the color bar signal generator to the peri connector (video input) on the rear panel.
- 2) Connect the oscilloscope to TP201 on the Y/ Chroma board.
- Load the VTR with a blank tape and place in the record mode.

Adjustment procedure

- 1) Turn RT202 fully counterclockwise so that the Y signal level is minimum.
- 2) Adjust RT201 so that the record chroma level shown in Fig. 9 is set to the value specified in Fig. 8.
- Adjust the record Y level after this adjustment is completed.

Cylinder mark	Level
0	30 mVp-p
1	30 mVp-p
2	35 mVp-p
3 ~ 4	40 mVp-p

Table-1 Record Chroma Level

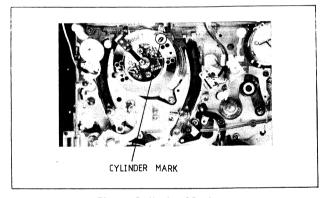


Fig. 8 Cylinder Mark

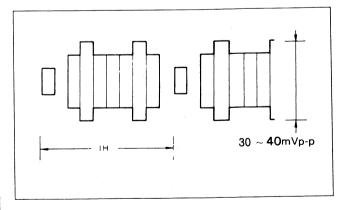


Fig. 9 Record Chroma Level

2. Record Y Level Adjustment: RT202

This adjustment optimizes the Y level during recording. When this adjustment is incomplete and the level is too high, the black and white inversion phenomenon may occur or S/N deteriorates causing a rough picture. On the other hand, when the level is too low, the S/N deteriorates.

- 1) Connect the same as shown in the previous item "Record Chroma Level Adjustment".
- Load the machine with a blank tape and place in the record mode.
- 3) Adjust RT202 so that the Y level at sync tip is 100 mV \pm 5 mV.

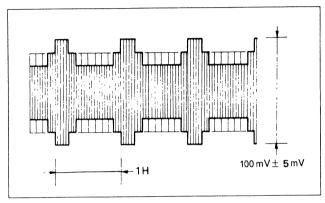


Fig. 10 Record Y Level

[For Type 4493 model]

3. Adjustment Secam Killer Level: RT351·L351

This adjustment sets the secam killer level to the specified value.

- 1) Supply a video signal (SECAM colour-bars) to peri connector (video input) on the rear panel.
- 2) Connect the oscilloscope to the test point terminal TP351.
- 3) Set the unit to the EE mode.
- 4) Turn the RT351 fully counterclockwise so that the sine wave about 7.8 kHz is to be min.
- 5) Turn the L351 so that the sine wave is to be max.
- 6) Turn the RT351 again so that the level of sine wave is $5.0Vp-p\pm0.1Vp-p$.
- 7) In case of the level of sine wave is over 5.0Vp-p even the RT351 fully counter clockwise, turn the L351 clockwise so that the level of sine wave is 5.0Vp-p.

3. FM AUDIO CIRCUIT ADJUSTMENT

Perform the following adjustments after removing the top cover and setting the VTR horizontal.

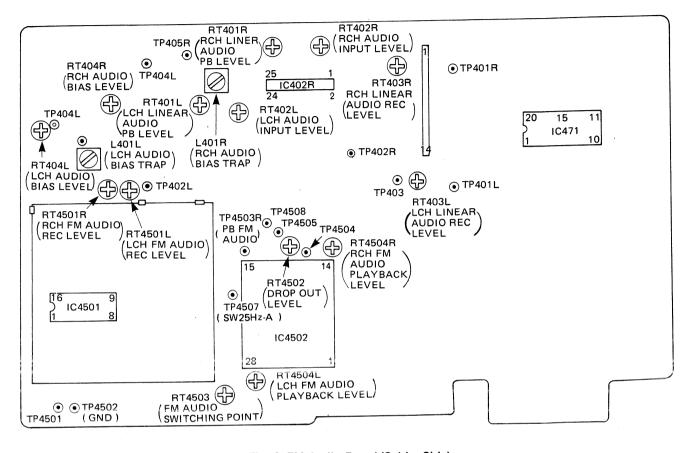


Fig. 9 FM Audio Board (Solder Side)

1. FM Audio Head Switching Point Adjustment: RT4503

This adjustment sets the switching point of the FM audio heads to the centre where the CH1 and CH2 envelopes overlap in the play mode. If this adjustment is incomplete, the envelope is degraded and noise appears.

- 1) Connect channel-1 of the oscilloscope to TP4507 SW25Hz-A).
- 2) Connect channel-2 of the oscilloscope to TP4503L, R (FM audio envelope).
- 3) Connect external trigger probe of the oscilloscope to TP4508 (SW25Hz).

- 4) Playback the Hi-Fi alignment tape.
- 5) Observe the waveforms at TP4507 (SW25 Hz-A) and TP4503L, R (FM audio envelope).
- 6) Adjust RT4503 so that leading or trailing edge of the SW25 Hz-A signal is set to the center of the FM audio envelope and dropout is not present. If the dropout cannot be cancelled, minimize it (less than 0.5H).

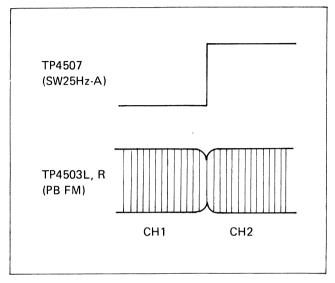


Fig. 10 FM Audio Switching Point

* Readjust this FM audio switching point when the switching point in the servo circuit is adjusted.

FM Audio Playback Level Adjustment: LCH: RT4504-L, RCH: RT4504R

These adjustments set the Lch and Rch outputs to the specified values.

- 1) Connect the VTVM to the Lch, Rch audio output jack on the rear panel.
- 2) Playback the Hi-Fi alignment tape.
- 3) Adjust RT4504L (Lch) and RT4504R (Rch) respectively so that the reading of the VTVM is -4.8 dBm.

3. Dropout Adjustment: RT4502

This adjustment sets the dropout detection level of the FM audio signal.

If this adjustment is incomplete and the level is too high, the dropout detector responds to small dropouts in the envelope and noise may appear. On the other hand, if the level is too low, dropouts cannot be compensated the Hi-Fi audio may not be muted when the tracking control is turned, or Hi-Fi audio may not be switched to linear audio when the envelope is missing.

- 1) Connect the DC voltmeter to test point terminal TP4506.
- 2) Playback the alignment tape. (not be recorded Hi-Fi alignment.)
- 3) Adjust RT4502 so that the voltmeter reads $3.3\pm$ 0.1V.

4. FM Audio Record Level Adjustment

Lch FM Audio Rec Level: RT4501L Rch FM Audio Rec Level: RT4501R

This adjustment sets the record current. If this adjustment is incomplete and the level is too high, the video S/N deteriorates and when the level is too low, the audio (Hi-Fi) S/N deteriorates.

- 1) Connect the oscilloscope to test point terminal TP4501 and TP4502 (GND).
- 2) Load a blank tape and set the VTR to the no signal record mode in the SP mode.
- 3) Turn RT4501R fully clockwise to minimize the Rch output signal.
- Adjust RT4501L so that the oscilloscope reads 55 mVp-p.
- 5) Adjust RT4501R so that the oscilloscope reads 210 mVp-p.

LINEAR AUDIO CIRCUIT ADJUSTMENT

5. Audio Input Level Adjustment: RT402L, RT402R

Optimum input level is regulated by this adjustment. When adjustment is not complete and level is too high, distortion is likely to occur; on the other hand, when level is too low, hissing noise becomes conspicuous, and also the noise reduction effect is degarded.

R-ch audio input level: RT402R

- 1) Connect audio signal generator (1 kHz: -2dB) to the peri connector (R-ch audio input) and apply audio signal.
- 2) Connect the VTVM to the R-ch TP401R.
- 3) Set the VTR to E-E mode.
- 4) Adjust RT402R (R-CH INPUT LEVEL) so that the reading of the VTVM is 210mV±10mV.

L-ch audio input level: RT402L

- Connect audio signal generator (1 kHz: -2dB) to the peri connector(L-ch audio input) and apply audio signal.
- 2) Connect the VTVM to the L-ch TP401L.
- Adjust RT402L (L-CH INPUT LEVEL) so that the reading of the VTVM is 210mV±10mV.

6. Linear Audio Playback Level Adjustment: RT401R, RT401L

The playback level is regulated by this adjustment. When adjustment is not complete and level is too low, the playback level drops and when the level is too high, the playback level becomes higher.

Audio R-ch playback level: RT401R

- Connect the VTVM to the peri connector (R-ch audio output) on the rear panel.
- Playback the 1kHz audio track section of the alignment tape.
- 3) Adjust RT401R (R-CH PLAYBACK LEVEL) so that the reading of the VTVM is -5±1dB.

Audio L-ch playback level: RT401L

- 1) Connect the VTVM to the peri connector L-ch audio output jack on the rear panel.
- Playback the 1kHz audio track section of the alignment tape.
- 3) Adjust T401L (L-CH PLAYBACK LEVEL) so that the reading of the VTVM is -5±1dB.

8. Audio Record Level: RT403R, RT403L

Optimum record level is regulated by this adjustment. When adjustment is not complete and the level is too high, distortion is likely to occur; on the other hand, when the level is too low, hissing noise becomes conspicuous, and also the noise reduction effect is degraded.

R-ch record level: RT403R

- 1) Connect VTVM to TP403R and connect audio signal generator (1kHz, -2dB) to the peri connector (R-ch audio input).
- 2) Adjust RT403R (R-CH RECORD LEVEL) so that the reading of the meter is -29dB±0.5dB.
- 3) Disconnect the VTVM and connect it to the peri connector (R-ch audio output).
- 4) Load the VTR with a blank tape and place it in the record mode for few minutes.
- 5) Playback the recorded section and confirm the reading of the meter to -2dB±0.5dB.
- If it is not, readjust RT403R with calibrating the audio reçord level at TP403R as shown below.

Example: The reading at the output jack is -10dB. Then the reading at TP402R is -4dB (-29-(-2)).

L-ch record level: RT403L

- 1) Connect VTVM to TP402L and connect audio signal generator (1kHz, -2dB) to the L-ch audio input iack.
- 2) Adjust RT403L (L-CH RECORD LEVEL) so that the reading of the meter is -29dB±0.5dB.
- 3) Disconnect the VTVM and connect it to the L-ch audio output jack.
- 4) Load the VTR with a blank tape and place it in the record mode for few minutes.
- Playback the recorded section and confirm the reading of the meter to -2dB±0.5dB.
- 6) If it is not, readjust RT402L with calibrating th audio input level as shown below.

Example: The reading on TP402L is -4 dB.

Then the input at the reading at TP402L is -27dB (=-29-(-2)).

9. Audio Bias Trap Adjustments

L-ch Audio Bias Trap: L401L, R-ch Audio Bias Trap: L401R

This adjustment prevents bias current from flowing to the audio processing system. When this adjustment is incomplete, the audio S/N deteriorates and sound is distorted.

Connecting test equipment

1) Connect the VTVM to TP402L, R.

VTR Condition

Load a blank tape and set the VTR to the record mode.

Adjustment procedure

 Adjüst L401L, R (Audio Bias Trap) to minimum reading.

4. MULTIPLEX DEMODULATOR CIRCUIT ADJUSTMENT (For Type 4493 model)

Remove the top cover set the VTR horizontal and follow the adjustment procedure shown below.

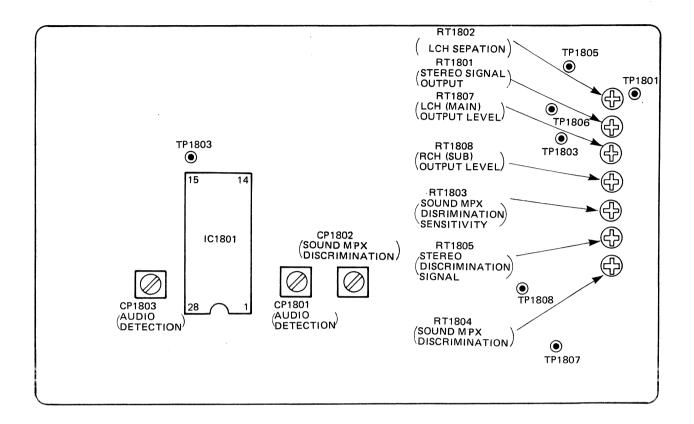


Fig. 11 Demodulator P.C. Board (Parts Side)

Note: 1. Set all the semi-variable resistors on the demodulator board to around the center of their variable ranges.

> Set the audio channel select switch to "CH1 + CH2".

1. Audio Detection Adjustment: CP1801, CP1803

- 1) Connect the oscilloscope and distortion meter to TP-1801 and TP1802.
- 2) Receive a bilingual broadcast.
- 3) Adjust CP1801 and CP1803 to maximize the output and fine adjust so the distortion is minimum.

2. Stereo Discri Signal Adjustment: RT1805

- 1) Connect the oscilloscope to test point terminal TP-1804.
- 2) Receive a stereo broadcast.
- 3) Adjust RT1805 to maximize the stereo distrimination signal (117.5Hz) output.

3. Sound M.P.X. Discri Signal Adjustment: RT1805

- Connect the oscilloscope to test point terminal TP-1804.
- 2) Receive a bilingual broadcast.
- 3) Adjust RT1804 to maximize the sound multiplex discrimination signal (274.1Hz) output.
- 4) And adjust CP1802 to maximize the sound multiplex discrimination signal (274.1Hz) output.

6-10

4. Sound M.P.X. Discri Sensitivity Adjustment: RT1803

- 1) Connect the oscilloscope to test point terminal TP-1803.
- 2) Receive a bilingnual broadcast.
- 3) Turn RT1803 from minimum (fully counterclockwise) to maximum (fully clockwise) and set it to the position where the output at TP1803 (shown in the figure) changes from Low to High.

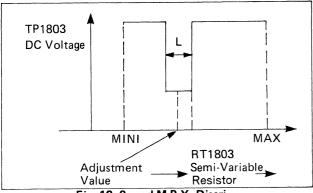


Fig. 12 Sound M.P.X. Discri

5. Stereo Signal Output Level Adjustment

1) Receive a stereo signai (400Hz/15kHz div.)

R-ch output level: RT1801

- 2) Connect the VTVM to TP1806 (R-ch)
- 3) Set the CH1 + CH2 select switch on the operation circuit board to "CH2" so only the L-ch signal is output.
- 4) Adjust RT1801 so the output level is 138mV.

6. L-ch Separation Adjustment: RT1802

- 1) Connect the oscilloscope to test point terminal TP-1807.
- 2) Receive a stereo broadcast.
- 3) Switch off the modulation of L-channel.
- 4) Adjust RT1802 to minimize the R-ch signal output.

7. L-ch (Main)/R-ch (Sub) Output Level: RT1807 (L-ch Main), RT1808 (R-ch Sub)

- 1) Connect the VTVM to test point terminal TP1807 (L-ch).
- 2) Receive a monaural broadcast.
- 3) Adjust RT1807 (L-ch) and RT1808 (R ch) so they are both --15±0.5dBm.

3. TIMER CIRCUIT ADJUSTMENT (For Type 4493 model)

Perform adjustment after removing the front cover.

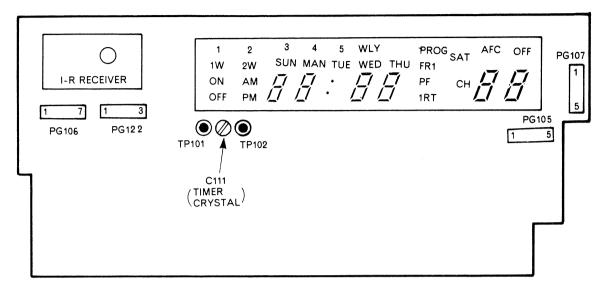


Fig. 13 Timer P.C. Board (Parts Side)

1. Timer Crystal Adjustment: C111

- 1) Connect a frequency counter to the test point terminals TP101 and TP102 (GND).
- 2) Set the unit to the STOP mode.
- 3) Set the GATE TIME of the frequency counter to 10 sec and adjust so that the frequency counter reading is 32.7680 kHz.

4. TUNER/IF CIRCUIT ADJUSTMENT (Type 4491 model)

Perform adjustment after removing the top cover.

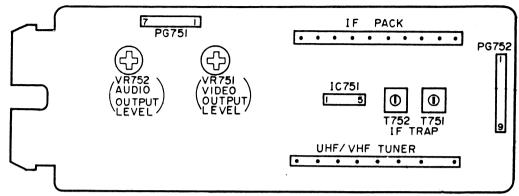
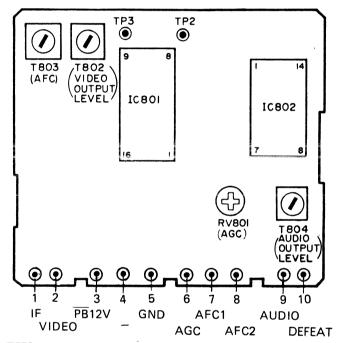


Fig. 14 Tuner/IF P.C. Board (Parts Side)



1. IF Trap Adjustment: T751 T752

Fig. 15 IF P.C. Board (Parts Side)

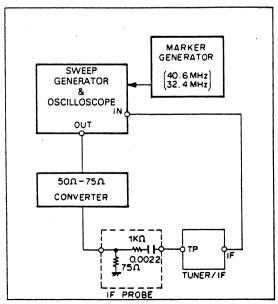


Fig. 16

- 1) Connecting test equipment
- 2) Set the unit to the EE mode.
- 3) For trap adjustment, turn to adjust T751 and T752 on the tuner/IF board to obtain to obtain 32.4 \pm 0.05MHz and 40.6 \pm 0.05MHz respectively.

2. IFT Adjustment: IFT (Tuner pack board)

1) Connecting test equipment.

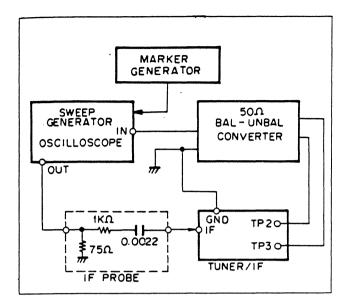


Fig. 17

- 2) Set the unit to the E-E mode.
- 3) Adjust the generator output so that the output waveform does not deviate.
- 4) Adjust the IFT on the tuner pack board so that the waveform shown in the diagram below is obtained.

- 3. Video Output Level Adjustment: T802
- 1) Connecting test equipment.

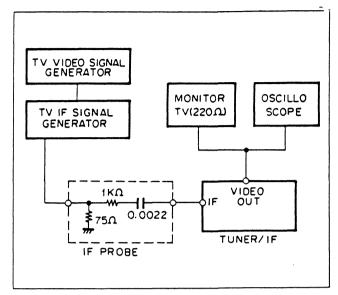


Fig. 19

- 2) Set the unit to the E-E mode.
- 3) Input the colour bar signal with a modulation of 87.5%.
- 4) Adjust T802 so that the p-p value is 1.0 \pm 0.1 Vp-p from the sync top of the waveform on the oscilloscope.
- 5) Check that the monitor TV picture is normal.

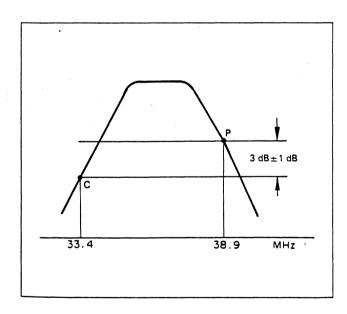


Fig. 18 IFT

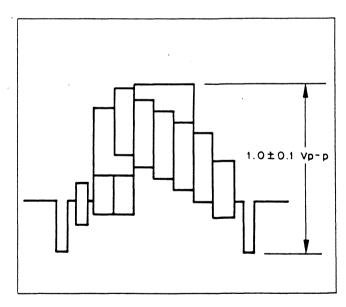


Fig. 20 Video Output Level

6-14

4. AFC Adjustment: T803

1) Connecting test equipment.

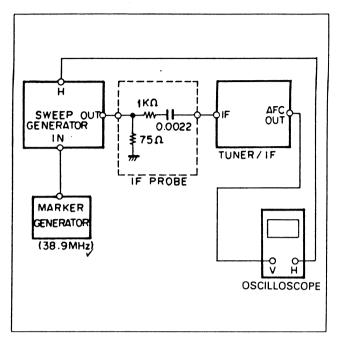


Fig. 21

- 2) Set the unit to the E-E mode.
- 3) Adjust T803 to obtain the "S" curve waveform as shown in the diagram below.

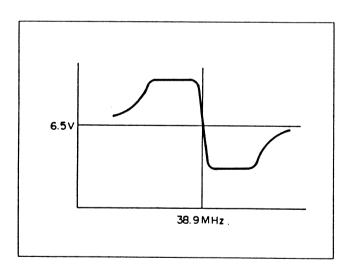


Fig. 22 AFC

5. Audio Output Level Adjustment: T804, VR752

1) Connecting test equipment.

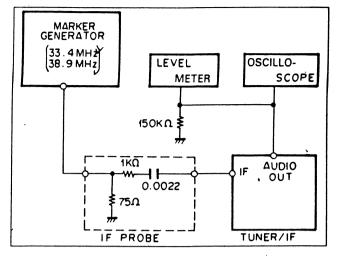


Fig. 23

- 2) Set the unit to the E-E mode.
- 3) Adjust T804 to minimiz distortion (less than 1.0%).
- 4) FM modulate (400 Hz/15 kHz div.) the generator signal (33.4 MHz), and adjust VR752 so that the audio output level is $116 \, \text{mV} 163 \, \text{mV}$.

6. AGC Adjustment: VR801

1) Connecting test equipment.

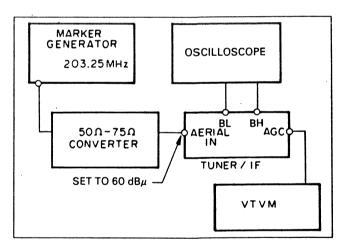


Fig. 24

- 2) Set the unit to the E-E mode.
- 3) Turn on the AFC switch.
- 4) Tune the tuner unit to CH-9.
- 5) Adjust VR801 so that the reading of the VTVM is $6.0 \pm 0.4 \text{V}.$

5. TUNER/IF CIRCUIT ADJUSTMENT (Type 4492 model)

Perform adjustment after removing the top cover.

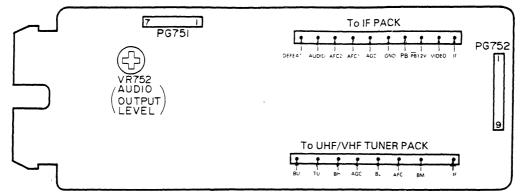
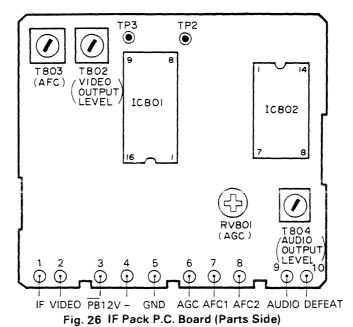


Fig. 25 Tuner/IF P.C. Board (Parts Side)



1. IFT Adjustment

Connecting test equipment

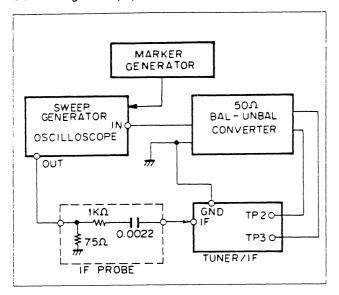


Fig. 27

VTR condition

E-E mode

Adjustment point

IFT (Tuner pack board)

Adjustment procedure

- Adjust the generator output so that the output waveform does not deviate.
- 2) Adjust the IFT on the tuner pack board so that the waveform shown in the diagram below is obtained.

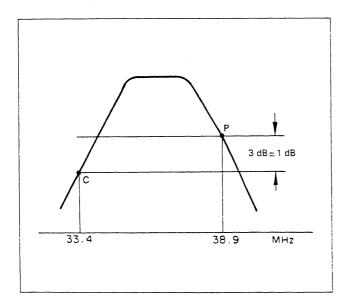


Fig. 28 IFT

2. Video Output Level Adjustment Connecting test equipment

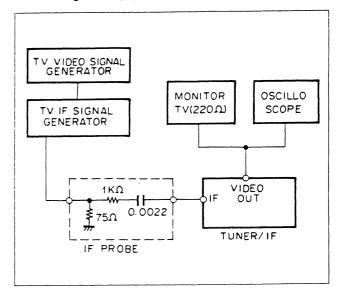


Fig. 29

VTR condition

E-E mode

Adjustment points

T802

Adjustment procedure

- 1) Input the colour bar signal with a modulation of 87.5%.
- 2) Adjust VR751 so that the p-p value is 1.0 \pm 0.1 Vp-p from the sync tip of the waveform on the oscilloscope.

Check items

1) Check that the monitor TV picture is normal.

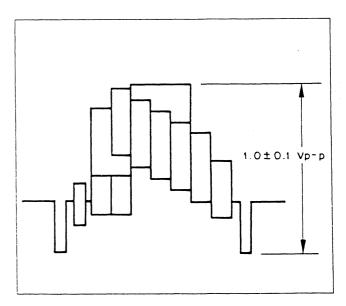


Fig. 30 Video Output Level

6-17

3. AFC Adjustment

Connecting test equipment

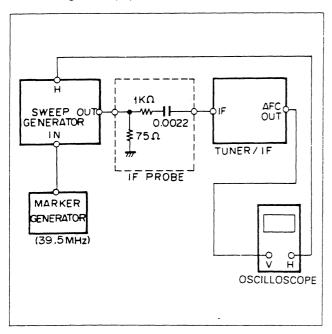


Fig. 31

VTR condition

E-E mode

Adjustment point

T803

Adjustment procedure

1) Adjust T803 to obtain the "S" curve waveform as shown in the diagram below.

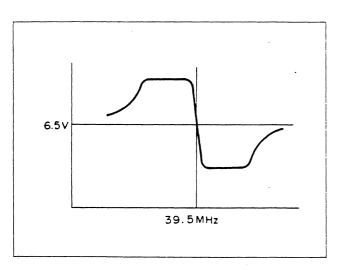


Fig. 32 AFC

Bang&Olufsen

4. Audio Output Level Adjustment

Connecting test equipment

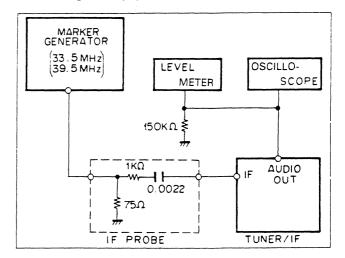


Fig. 33

VTR condition

E-E mode

Adjustment points

T804, VR752

Adjustment procedure

- 1) Adjust T804 to minimize distortion (less than 1.0%)
- 2) FM modulate (400 Hz/15 kHz div.) the generator signal (33.5 MHz), and adjust VR752 so that the audio output level is 116 mV 163 mV.

5. AGC Adjustment

Connecting test equipment

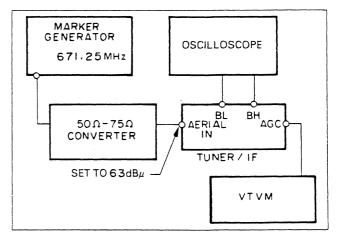


Fig. 34

VTR condition

E-E mode (AFC ON)

Adjustment point

VR801

Adjustment procedure

- 1) Tune the tuner unit to CH-46
- 2) Adjust VR801 so that the reading of the VTVM is 6.0 ± 0.4 V.

6. TUNER/IF CIRCUIT ADJUSTMENT (Type 4493 model)

Perform adjustment after removing the top cover.

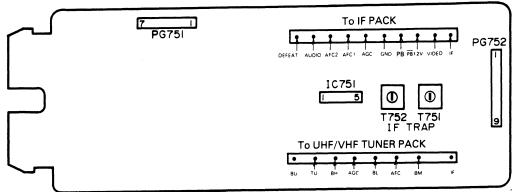


Fig. 18 Tuner/IF P.C. Board (Parts Side)

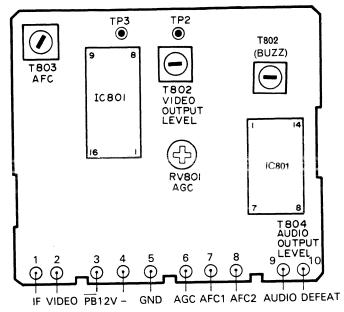


Fig. 19 IF Pack P.C. Board (Parts Side)

1. IF Trap Adjustment: T752 Connecting test equipment

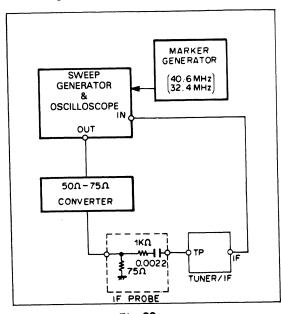


Fig. 20

VTR condition

E-E mode

Adjustment procedure

For trap adjustment, turn to adjust T751 and T752 on the tuner/IF board to obtain to obtain 32.4 \pm 0.05 MHz and 40.6 \pm 0.05 MHz respectively.

6-19

2. Video Output Level Adjustment: T802

Connecting test equipment

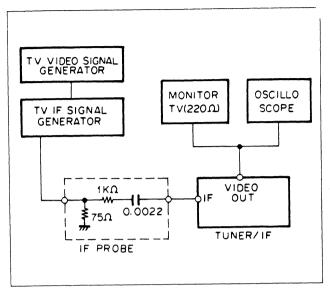


Fig. 21

VTR condition

E-E mode

Adjustment procedure

- 1) Input the colour bar signal with a modulation of 87.5%.
- 2) Adjust VR751 so that the p-p value is 1.0 \pm 0.1 Vp-p from the sync tip of the waveform on the oscilloscope.

Check items

1) Check that the monitor TV picture is normal.

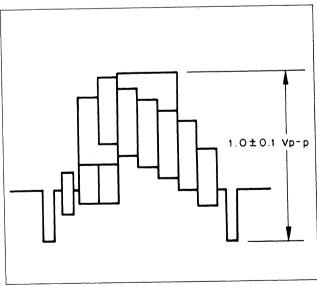


Fig. 22 Video Output Level

Bang&Olufsen

3. Buzz Adjustment: T801 Connecting test equipment

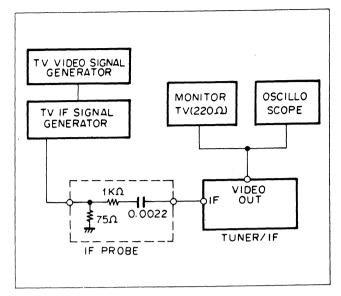


Fig. 23

[INPUT SIGNAL]

VIDEO SIGNAL: COLOUR BAR \rightarrow 87.5% modulation OUTPUT 80 dB μ

AUDIO SIGNAL (33.4 MHz): FM MODULATION; 400 Hz, 30 kHz Dev.), OUTPUT ightharpoonup 67 dB μ

VTR condition

E-E mode

Adjustment procedure

- Check that the specified video and audio outputs are obtained, then turn off the audio modulation.
- 2) Raise the audio vertical sensitivity of the oscilloscope.
- 3) Adjust T801 to minimize the buzz level.

4. AFC Adjustment: T803 Connecting test equipment

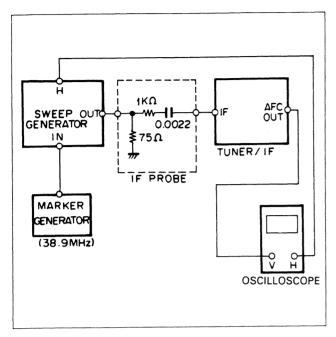


Fig. 24

VTR condition

E-E mode

Adjustment procedure

1) Adjust T803 to obtain the "S" curve waveform as shown int he diagram below.

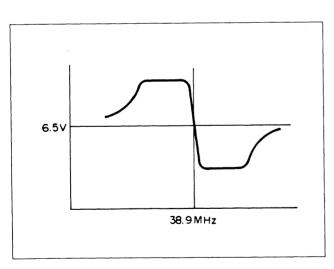


Fig. 25 AFC

5. AGC Adjustment: RV801 Connecting test equipment

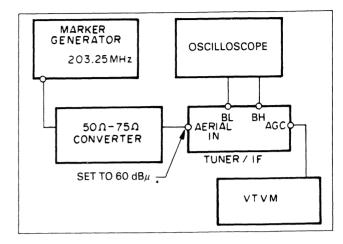


Fig. 26

VTR condition

E-E mode (AFC ON)

Adjustment procedure

- 1) Tune the tuner unit to CH-9.
- 2) Adjust RV801 so that the reading of the VTVM is 6.0 ± 0.4 V.

MECHANISM ADJUSTMENT

1. MECHANISM STATE SWITCH ADJUSTMENT

This mechanism state switch is positioned near the loading gear at the bottom of the chassis, and detects the loading condition of the mechanism and controls the loading motor. If this switch is not installed correctly, loading is not done and the mechanism does not operate normally.

- Turn the worm pulley counterclockwise just before the resistance increases.
- 2) Loosen the mechanism state switch fixing screw and slide the switch.
- Tighten the screw at the point where the groove showing the stop mode and the triangular hole of the slide knob match.
 - (Adjust while viewing from the right above.)

Operation check

Load a blank tape and check that loading and unloading are done correctly in all the modes. When faulty operation occurs, readjust the mechanism state switch installation position.

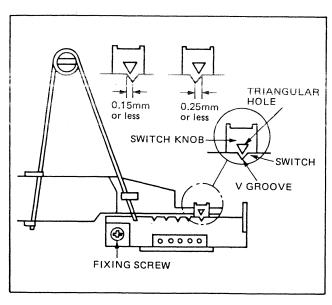


Fig. 1 Mechanism State Switch

2. TAPE TRANSPORT SYSTEM CHECK/ADJUSTMENT

The tape transport system is the path from the supply reel disk to the take-up reel disk via the video head. The transport system parts, especially the parts which directly come into contact with the tape, should be kept clean without scratche, dust and oil, etc. on contact surfaces.

The tape transport system is adjusted when the unit is shipped from the factory, so when the transport system parts are replaced, the tape transport becomes stable by adjusting only the replaced parts.

Do not loosen the fixing screws of the parts shown below. When it is required to replace parts, be sure to install the new ones in the original positions.

1) Catcher/cylinder base

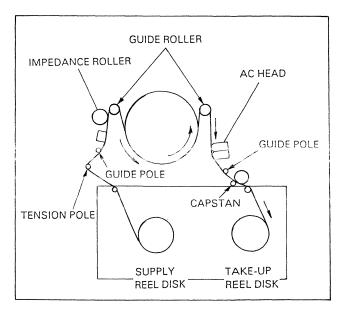


Fig. 2 Tape Transport System

1. Reel disk height adjustment

- Remove the top cover and shield cover place the master plane on the cassette holder and lower the holder
- 2) Place a reel disk height jig on the master plane and apply it to the reel disk.
- Check that the top of the reel disk is positioned between sections A and B of the reel disk height jig.
- 4) When the top of the reel disk does not enter between sections A and B, adjust the number of spacers (2 types: 0.25 mm or 0.5 mm thick) at the bottom of the reel disk.

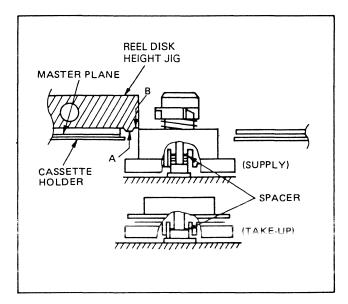


Fig. 3 Reel Disk

2. Tension pole position and tension adjustments

Adjust the tension pole position and tension at the same time, and check the tension pole position and tension. Perform the adjustments with the top cover and shield cover removed.

Position adjustment

- Cover the light receiving port of the supply end sensor using paper, etc.
- Press the play button without loading a cassette and set the VTR to the loading mode.
 (Refer to "How to set the VTR in the loading mode without loading a cassette".)
- Loosen the tension band bracket fixing screw and insert the tip of a flat screwdriver into the groove between the bracket and the chassis.
- 4) Slide the tension band bracket using the screw-driver, and set the gap between the tension pole and chassis to $1 \sim 2$ mm.
- 5) Tighten the bracket fixing screw.
- 6) Set to the loading mode again without a cassette after adjustment and check the tension pole position.

Tension adjustment

- 1) Load a tension cassette and play it back mode.
- 2) Adjust so that the reading of the tension cassette is $30 \sim 40 \, \text{c} \, \text{cm}$.
- 3) When the reading of the tension cassette is higher than the reference value, move the spring hooking position in direction a, and when it is lower, move in direction b, to set the value as specified.
- 4) When the tension is changed greatly (to 6g·cm or more), check the tension pole position again. When it is incorrect, readjust the tension pole position and tension.
- 5) Remove the paper covering the sensor after adjustment.

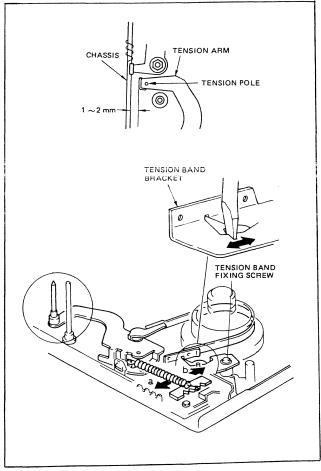


Fig. 4 Tension Pole/Tension Band

3 Guide pole height adjustment (Supply)

Guide pole height adjustment: Perform rough adjustment using the master plane and reel height adjusting jig first, and then run a blank tape to adjust the height precisely.

- 1) Remove the top panel and cassette holder.
- 2) Mount the master plane and place the reel height adjusting jig on the master plane .
 - Then, roughly adjust the guide pole height adjusting nut so that the gap between the flange of the guide pole and the reel height adjusting jig is within $0 \sim 0.2$ mm when side C of the jig is applied to the guide pole.
- 3) Install the cassette holder, load a blank tape and play it back. Check that the tape does not ride over the flange of the guide pole.
- 4) Tighten the adjusting nut and apply locking paint after adjustment is completed.

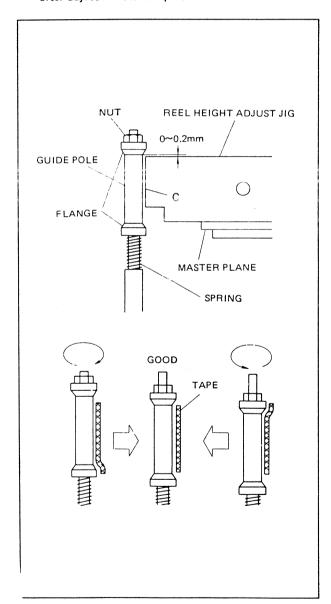


Fig. 5 Guide Pole Height

4. Guide roller height Adjustment

- Remove the top cover and shield cover, place the master plane on the cassette holder and lower the holder.
 Place the reel disk height jig on the master plane and apply it to the guide roller.
- Tighten the guide roller fixing screw at the position where the upper flange of the guide roller and the top of reel disk height jig match.
- Run the tape and check that it does not curl or ride over and then perform electrical adjustment.
- 4) Connect the oscilloscope to TP202 or PG208-1 (FM output) on the Y/Chroma board.
- Play back the color bar test tape and set the tracking control to the click position.
- 6) Check that the FM waveform is flat.
- 7) Then check, that the FM drop of the envelope at two positions is equal when the tracking control is turned to the left and right.
- 8) When it cannot be confirmed, loosen the guide roller fixing screw and turn the guide roller slightly to the left and right so that the envelope is flat.
- 9) Tighten the fixing screw.

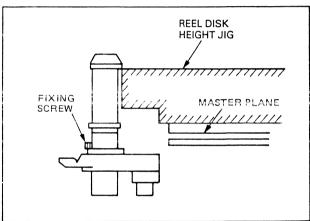


Fig. 6 Guide Roller

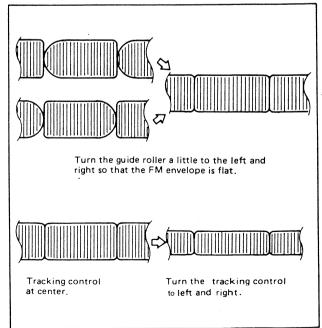


Fig. 7 FM Output

5. A/C head adjustment

Adjust the height, tilt and azimuth for the A/C head, then adjust the X value. Repeatedly adjust the former 3 items and determine the A/C head fixing position and then adjust the X value. The details of the adjustment below show the adjustment procedure when the A/C head is replaced.

Be sure to adjust precisely after performing coarse adjustment.

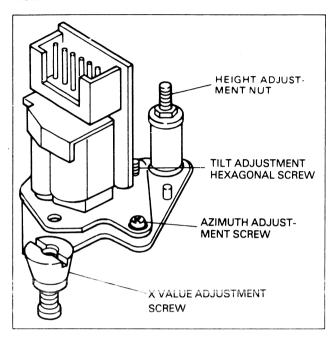


Fig. 8 A/C Head

Coarse adjustment

- Tighten the A/C head fixing screw through the bottom of head base (2) via the spring so that the tip of the screw protrudes approx. 3 ~ 4 mm above head base (1). (Refer to Fig. 9)
- Adjust the tilt adjusting hexagonal screw and azimuth adjusting screw so that head base (1) and head base (2) are parallel.
- 3) Place the master plane on the cassette holder and lower the holder.
- 4) Place the reel disk height jig on the master plane and bring it near the A/C head, then adjust the height adjusting nut so that the gap between the reel disk height jig and the shield case of the A/C head is approx. 0.5 mm. (Refer to Fig. 10)
- 5) Remove the adjusting jigs, load a blank tape and set the VTR to the play mode. Check that conspicuous curling or riding over of the tape does not occur around the A/C head. When conspicuous curling or riding over, etc. occurs, readjust the tilt adjusting hexagonal screw, azimuth adjusting screw and height adjusting screw. The height of the A/C head should be approx. 0.1 ~ 0.15 mm above the bottom of the control head core. (Refer to Fig. 11)

Precise adjustment

- 1) Connect the L-ch audio output and CH-1 of the oscilloscope, and connect the R-ch audio output and CH-2.
- Adjust playback level controls RT401L, RT401R described in the audio circuit adjustment for the maximum outputs.
- 3) Playback the audio 7kHz signal on the alignment tape. Turn the adjustment screws for the tilt, azimuth and the AC head height alternately so the audio outputs from the both channels shown in Fig. 11 are maximum and the envelopes are flat and stable. When the audio output levels from the two channels differ, adjust the levels to their average value.
- 4) Confirm that the phases of both channels match. When they differ, readjust the azimuth adjustment screw.
- Perform the playback level adjustment described in the audio circuit adjustment.

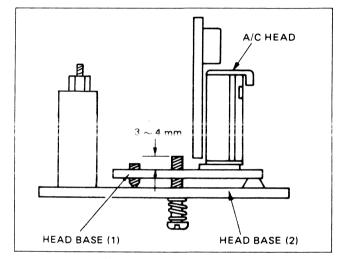


Fig. 9 Azimuth/Tilt Adjustments

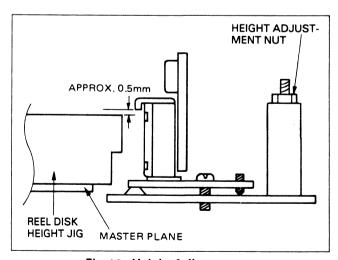


Fig. 10 Height Adjustment

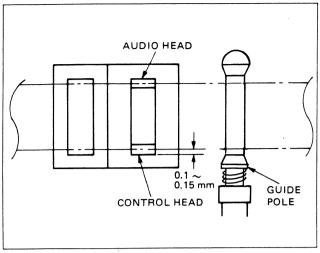


Fig. 11 Height Adjustment

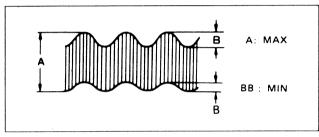


Fig. 12 Audio Outut

X value adjustment

- * Be sure to perform "Tracking Preset Adjustment" before adjusting the X value.
- 6) Connect the oscilloscope to the FM output pin (TP-4503) of the FM audio P.C. Board.
- 7) Load the VTR with the Hi-Fi audio alignment tape and playback it.
- 8) Set the tracking control to its center click position and adjust the X value adjusting screw so that the peak-to-peak value of the FM envelope is maximum. Fig. 13 shows the variation characteristics of the peak-to-peak value of the FM envelope with respect to the turning of the tracking control when the X value is optimized using an alignment tape.
- 9) Check item 10) again.
- 10) Lock the tilt adjusting hexagonal screw, X value adjusting screw, azimuth adjusting screw and height adjusting nut with paint after adjustment is complete.
- Perform the playback level adjustment and bias level adjustment described in the audio circuit adjustment.
- 12) Adjust the guide roller height after this adjustment is complete.

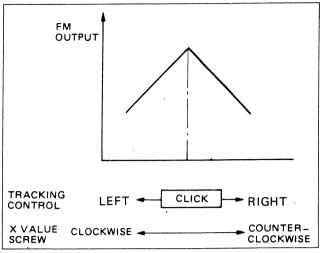


Fig. 13 Tracking Characteristics

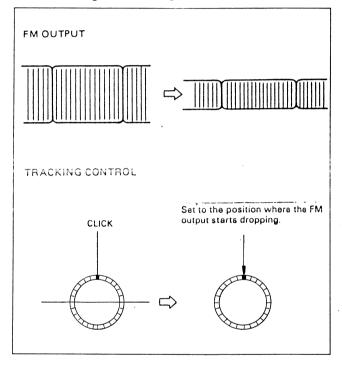


Fig. 14 X Value

Adjustments after replacing the cylinder (video head)

When the cylinder is replaced, the relative height with the guide roller and the X value, etc. drift, so it is required to adjust the tape transport system and servo system.

Note: The drift of the relative height and X value are so little when the cylinder is replaced normally, so they can be corrected by electrical adjustments.

- Check that curling and creasing are not present around the guide roller.
 - When they are present, adjust the guide roller height.
- 2) Perform the tracking preset adjustment (servo circuit).
- 3) Adjust the X value (See "A/C head adjustment".).
- 4) Check the flatness and level change of the FM output. The method to check is described later.
- 5) Adjust the servo circuit and Y/Chroma circuit.
 - O Head switching point adjustment (Servo circuit)
 - Record Y/Chroma level adjustments (Y/Chroma circuit)

Checking the flatness and fluctuations of the FM output

- 1) Set the tracking control to the click position.
- 2) Fine adjust the voltage level range of the oscilloscope to set the FM output to 4 graduations.
- 3) Turn the tracking control to set the max, amplitude of the FM output to 3 graduations.
- 4) Check that the minimum amplitude is more than 2 graduations at this time.
- 5) Check that the level fluctuation is less than 13% at max and min.

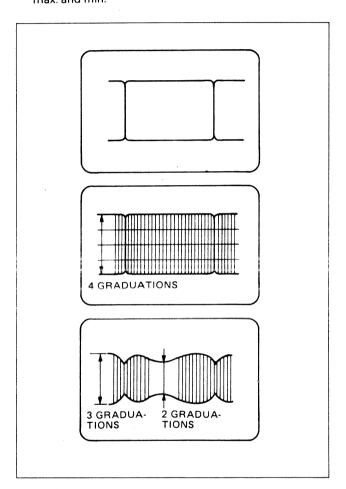


Fig. 15 FM Envelope Flatness

3. TENSION AND TORQUE CHECKS

Checking the tension, torque and the compression strength at the movable section of the tape take-up section is required to smooth the tape transport and to satisfy the fundamental functions of the VTR. When the tape transport is not smooth or the tape speed is abnormal, perform this checking to find out the faulty section, replace the faulty parts and check again.

- Note 1: The value measured while sliding the torque gauge at the speed of 0.8 rps using the torque gauge and torque gauge adapter. The main brake torque, however, shows the value measured while turning the take-up reel counterclockwise and the supply reel clockwise by hand at the speed of 0.8 rps.
- Note 2: The value measured while drawing the take-up reel disk counterclockwise and the supply reel disk clockwise at the speed of 50 mm/sec using the dummy reel and fun type tension gauge.

Item	VTR operation mode	Measured reel	Measurement value	Remarks
Main brake torque	Stop	Supply & take-up reels	170g⋅cm or more	Note 1
Unloading torque	Unloading	Supply reel	90 ~ 190g·cm	Note 1
Fast forward torque	Fast forward	Take-up reel	400g.cm or more	Note 1
Rewind torque	Rewind	Supply reel	400g cm or more	Note 1
Take-up torque	Play	Take-up reel	90~180g·cm	Note 1
	Fast forward	Supply reel		None 2
Back tension torque	Rewind	Take-up reel	- 4~15g⋅cm	Note 2

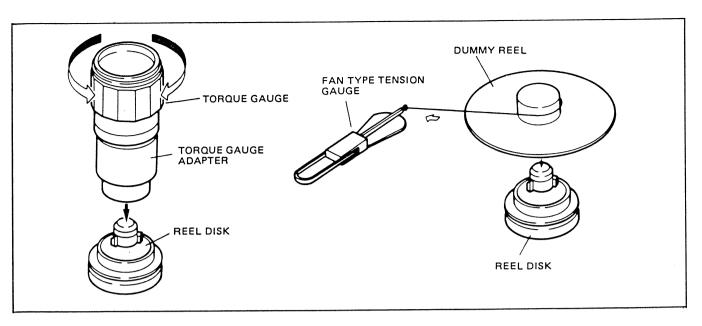


Fig. 16 Tension/Torque Measurement

4. HOW TO PLACE THE VTR IN THE LOADING MODE WITHOUT LOADING A CASSETTE

Method 1

- 1) Remove the side panel/L.R.
- 2) Remove the top cover.
- 3) Apply paper, etc. over the light receiving ports (A) of the end sensors on both sides of the cassette holder.
- 4) Lower the cassette holder while pressing tabs (B) on both sides of the cassette holder. All operation modes can be input to the VTR in this condition. The rewind operation, however, can be doen only for a few seconds because the take-up reel disk is in the stop mode and reel pulse detection is not possible.

Be careful in that when the covering paper, etc. is too thin, the end sensor detects infrared rays or external light, and it may not be possible to input each operation mode.

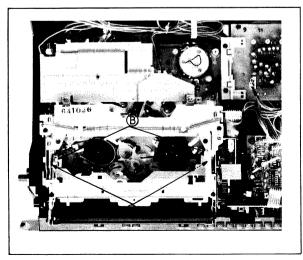


Fig. 17 Cassette Loading Mechanism

Method 2

- 1) Remove the side panel/L.R.
- 2) Remove the top cover.
- 3) Unplug the power cord of the VTR from the AC outlet.
- Disconnect the connector (PG04) from the cassette loading motor circuit board.
- 5) Connect a jumper between pins 2 and 5 of connector (PG04).
- 6) Plug the power cord of the VTR into the AC outlet.
- 7) Turn "on" the power siwtch of the VTR.
- 8) The above procedure enables to operate the VTR without loading a cassette tape.
- Note 1: Operate the play and record buttons simultaneously while pressing the safety tab switch lever in order to place the VTR in the record mode.
- Note 2: After the above operations are completed, disconnect the jumper and connect the connector (PG04) to the cassette loading motor circuit baord, then unplug the power cord of at the VTR from the AC outlet to reset the system control microprocessor.

INSULATION TEST

EVERY set **must** be insulation tested after having been dismantled. The test is carried out when the set is fully assembled and ready to be delivered.

Make the insulation tetst as follows:

Short circuit the two pins of the mains plug. There are connected to one of the terminals and the insulation tester.

Connect the other terminal of the insulation tester to chassis of one of the two antenna sockets.

OBS!

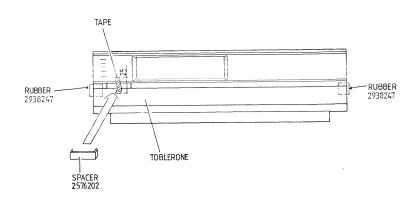
To avoid damaging the BEOCORD it is important that both terminals from the insulation tester have very good contact.

Now the voltage control of the insulation tester is turned slowly until a voltage of 1,5-2 kV is obtained. Hold this voltage for 1 sec., then slowly turn down again.

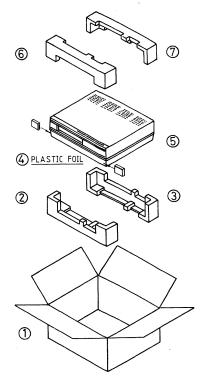
At no point during the testing procedure any flashovers are permissible.

PACKING

1 3391900 Carton Box 2-3-6-7 3397596 Cushion 4 3390248 Soft Sock



When repacking please follow these instructions (1) - (2) - (3) ...etc.



SERVICE TIPS

Note

- 1. Voltage measured at base of chassis with minimum volume control and no signal
- () are shown in recording condition.

 2. Nomenclature of Resistors and Capacitors.

[Circuit No.		
[]	Value	No indicated Ω (Ohm) M : 1000kΩ		
R101 150	Tolerance	No indicated ± 5% K: ± 10% M: ± 20%		
	Wattage	No indicated ¼ W		
	Sort	No indicated Carbon film RC : Composition RW : Wire wound RS : Oxide metal film RN : Fixed metal film		

г		Circuit	No.	
	Value	No indic P : Pl		
1 c101 T0.001-M	Tolerance	J:± M:± Z:+ D:±	ted ± 10% 5% 20% 80%, - 20% 0.5pF 0.25pF Ceramic Electrolitic Mylar Polyester Styrol	
		41-	Ceramic	
		<u>+</u> #	Electrolitic	
	Sort	™ ‡	Mylar	
		°÷	Polyester	
+ <u>L</u> C102		s 🛨 .	Styrol	
-T16V.1	Voltage	No indic	ated 50WV	

- 3 Be sure to make your orders of resistors and
- apacitors with value voltage, tolerance and sort.

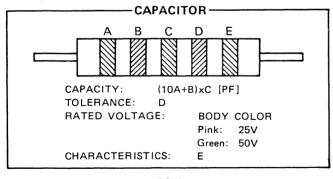
 When replacing capacitors marked With * use specified ones stated on parts list since required temperature characteristics

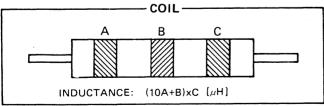
Caution on use of MOS IC



- 1. The MOS IC is inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during their storage. Avoid removing ICs from this foam, pacing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
- 2. High voltages may be applied during soldering caused by leagages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
- 3. The human body, clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because the friction, so a workers should be grounded.
- 4. Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

HOW TO READ CAPACITY AND INDUCTANCE OF RESISTOR SHAPE CAPACITORS AND COILS





COLOR	A, B	С	D	, E
Black	0	10°	±20%	For temperature compensation
Brown	1	10¹		
Red	2	10²		
Orange	3	10³		
Yellow	4	104		
Green	5	105		
Blue	6			·
Violet	7			
Grey	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10-1	± 5%	
Silver		10-2	±10%	High dielectric constant type

1. 12V Shift Voltage

12V shift voltage (21 pole A/V plug pin 8) can be totally inhibited by cutting diode 501 jack PCB.

2. Lift Assembly

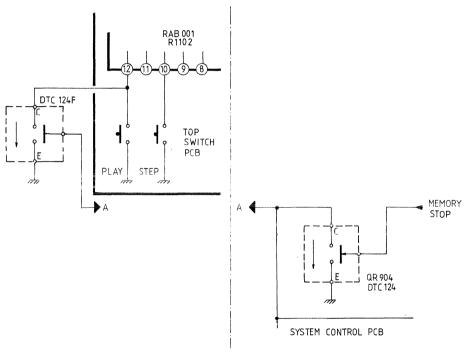
Mechanism can be operated without lift assembly when PG04 on lift assembly is disconnected and a 1 kohm resistor is connected between pin 2 and 3 on PG04 (resistor only necessary at first start after mains off).

3. Timer Function

By connecting D107 cathode to junction R119/R123 (point just below cathode on PCB) the clock speed is increased 60 times for use when testing timer function.

4. Automataic Playback

Automatic playback can be established by connecting a lead from collector of QR904 to the base of an additional transistor (DTC 124F) with collector connected to pin 12 of R1102 on top switch PCB and emitter to ground.



When reaching tape end, the set will automatically return to 0000 and go into playback mode.

5. 21 pole A/V plug

Video output level 1V ± 3 dB/75 Ω . Audio output level 600 mV/1 k Ω .

6. Remote control

When connecting VCR to future products it may be necessary to delete the IR pulse extender circuit on Remote Control PCB. This is done by cutting C 1106.

7. Re-set of channels from programmes

Total re-set of all programmes can be made in the following way:

- 1. Swich off the VCR at the main switch on the back.
- 2. Place the tuning switch in the "select" mode.
- 3. Press the fine-tuning buttons + and and switch on the main switch at the same time.
- 4. Keep the fine-tuning pressed until light appears in the clock display.
- 5. All channels are now re-set, and new programming of tuner can be made.

PIN SPECIFICATIONS

1-7. System Control IC (IC901) Pin Specifications

Function: Circuit/motor control in each mode, Mechanism state/trouble detection

Pin	I/O	Active Level	Abbreviation	Function
1	0	↑ ↓	CLOCK	Clock pulse necessary for communications of data at pins 2 and 3.
2	I	+	DATA (T-S)	Communicating data bus with Timer µP.
3	0		DATA (S-T)	Communicates data while synchronizing with the clock pulse at pin 1. (Refer to Table 1-3).
4	0	Hi	MUTE	Audio/video muting control output. · During loading: Hi
5	0	Hi	M.CUT	Video output ON/OFF control output during loading.
6-15		Indicator li	ghting control outputs r	not used in this unit.
6	0	Hi	STOP INDI	For stop mode (not used in this unit)
7	-	_	_	-
8	-	-	_	-
9	1-	_	_	-
10	0	Hi	REW INDI	For rewind mode (not used in this unit) Lights in the rewind mode. Flashes in the reverse search mode.
11	0	Hi	F.FWD INDI	For fast forward mode (not used in this unit) Lights in the fast forward mode. Flashes in the forward search mode.
12	0	Hi	PAUSE INDI	For pause mode (not used).
13	0	Hi	PLAY INDI	For play mode (not used) Lights in the play, trick play, record and audio dub modes.
14	0	Hi	REC INDI	For record mode (not used)
15	0	Hi	POWER INDI	Indicates the power switch ON state.
16-18				
16	0		A/D IN	Receives a pulse of which trailing edge varies depending on the operation command to descriminate the operation command.
17	0		V(RX) RESET	Pin 17 and pin 18 output timing pulses to the A/D converter to discriminate the operation command.
18	0		DISCHARGE	the operation command.
19	I	_	A/D SW	Determines the functions of pins 16, 17 and 18, should be grounded in this unit.
20	I			Determines the specification of visual search function, should be connected with VVC in this unit.
21	I	Hi	C.PAUSE	Detects the camera pause or remote pause command. When this pin becomes Hi, the unit enters the pause mode, and the pause mode cannot be released by operating the PAUSE button on the VTR not used in this unit.
22	0	1-	_	Not used
23	0	Hi	REVERSE	Capstan reverse control output. · During reverse search, phase matching: Hi.
26	I	Hi	RESET	μP RAM reset pin \cdot Initializes the μP with the Hi input
27]_		GND	Grounds the µP

Pin	I/O	Active Level	Abbrev	iation	Functi	on				
28	-	_	GND		Groun	Grounds the μP				
29	-	_	osc		Sets th	ie µP referen	ce oscillati	on frequency	7.	
30	-	_	-							
32	I	Hi	+B		μP pov	ver input (1C)V)			
33	I	Hi	SAFET	Ү ТАВ	Detects · Reco	s record enal	ole (safety d with Hi i	tab) nput (tab: pr	ovided)	
34-38	L	Detect cass	ette holder s	state/mech				1 (1		
34	I	Lo	M.STA	ГЕ О	Detect	mechanism	state.		•	
35	I	Lo	M.STA	ΓE 1	Provide	e the data for	controllin	g the tape lo	ading motor.	
36	I	Lo	M.STA	ГЕ 2	*1: PL	AY, REC, FW	D SEARCI	H, STILL		
		•		STOP	F.F/REW	REC PAUSE	PB*-1	REV SEARCH	IN TRANSITION	
			10	Lo	Lo	Hi	Hi	Hi	Hi	
			11	Hi	Lo	Lo	Lo	Hi	Hi	
			12	Hi	Hi	Hi	Lo	Lo	Hi	
37	I	Hi	CST DC	WN		cassette hold the data for		g the cassett	e loading motor.	
38	I	Hi	CST UP							
				IID	CA COPYE	n n m	D A NOTES	y l sow		
			0.5	UP	CASSETT		RANSITIO			
			37	Lo	Lo	Hi	Hi			
			38	·Lo	Hi	Lo	Hi	i Hi		
39	_	-	-		-	_				
42	I	Hi	DEW			condensatio				
					· Flash	ading to stop les the stop i its accepting	ndicator in	Hi period.	III and 4	
43	I	Lo	SP			peed data in				
40	1	Lo	SI						ing the frame advance operation	
44	I	Hi	REW EN	ND	Detects · Unloa	reverse tape ading to stop	e end using with Hi in	g the takeup put.	end sensor.	
45	I	Hi	FWD EN	ND		forward tap				
					· Auto	ading to stop rewind is pe orward.	with Hi in rformed w	put during to ith Hi input	imer recording. during search, play, record,	
46	I		REEL L	OCK			tation.			
					Measur bottom	Detects reel disk rotation. Measures the periode of the pulse generated by the Hall element at the bottom of the reel disk. Unloads/stops the unit if the input period is more than specified.				
				Mode Detection Spec					on Specifications ./2 period)	
					SEAR	IAL REC/PL CH, DOUBLE		More than More than		
					F. FW	, SLOW D, REW		More than	1,5 sec	
					SEAR STILL	CH, DOUBLE ., SLOW		More than	3 sec	

Pin	I/O	Active Level		Abbr	reviation		Fun	Function						
47-49		2-chan	nel (cas	sette lo	oading, taj	oe loadi	ng), n	nore driv	er control	outputs.				
47	0	Hi		LM(-): МОТОІ	3 3	Cass	sette load	ling/tape lo	ading mot	or dr	ive outputs.		
48	0	Hi		LM(+	+): MOTC	R 2								
						STOP	L	OAD	UNLOAD	BRAKE	Ī			
				Pir	n 48	Lo		Hi	Lo	Hi				
				Pir	n 47	Lo		Lo	Hi	Hi				
49	0	Hi		TAPE LOAD: MOTOR 1		Hi: 7	Dual loading motor driver drive switching output. Hi: Tape loading drivere operated Lo: During the cassette loading driver operation and in the normal mode.							
50	I	-	CYL LOCK			· Un	ects abno loads/sto low 1.5 F	rmal cylind ops the uni Iz.	ler rotation it if the fre	quen	cy of the SV	V30 Hz puls	se is lowered	
51	0	Hi	CAPST 3			Caps	Capstan motor control outputs.							
52	0	Hi		CAPS	ST 2									
53	0	Hi CAPST 1												
			PLA FW SEAR	D .	REV SEARCH	SLA REMO (RE	VAL	F.FWD START) REV		REWIND	BRAKE	
		51	Hi		Lo	Lo	,	Hi	Hi	Lo		Lo	Hi	ĺ
		52	Lo	,	Hi	Lo	•	Lo	Hi	Hi		Lo	Hi	
		53	Lo	,	Lo	Hi		Hi	Lo	Hi		Hi	Hi	
54	0	Hi		POW:	ER TROL		Powe · Be	er switch comes H	state dete li with pow	ection outpurer switch (ıt. ON.			
55	-			_			-							
59	0	Hi		F.AD	V		Fran	ne advan	ce mode co	ontrol outp	ıt.			
60	0	Hi		PAUS	SE		Paus	se mode	control out	put.				
61	0	Hi		SEAF	RCH		Visu	al search	n mode con	trol output	•			
62	0	Hi		PLAY	Y		Play · Pla	mode co ay/Audio	ontrol outpo Dub mode	ut. es: Hi				
63	0	Hi		RECO	ORD		Reco	ord mode	control ou	ıtput.				
64	_	_		_			-	-						

Servo LSI (IC604) Pin Specifications

Cylinder phase/speed control
Capstan phase/speed control
Tape speed automatic discrimination
Phase matching control
Vert. drive pulse generation
Noise processing still control
Capstan and cylinder speeds can be set without adjustment.

Pin	1/0	Active Level	Abbreviation	Function					
1	-	_	_						
2	I	Lo	GND	Grounds IC.					
3	I		TRACKING	Tracking monostable multi Tracking control connects	vibrator (Tracking MM) delay determination. here.				
4	I		PB CTL	Playback CTL pulse input. The input CTL pulse is supplied for the following applications. For play speed discrimination (not used in this unit) For capstan phase control during play (operated at 25 Hz)					
5	0	Hi	SP/LP	SP mode discrimination ou Hi only in SP.	tput.				
· The	tape spe input lev	el at pin 9, and	ding is determined by the tape speed during	Mode	Discrimination Data Source				
peri	ods of th	e CTL and CFG	lation between the pulses. The discriminate is as follows (not	REC	Pin 9 input DC level				
	on data s l in this		lode is as follows (not	PLAY, SEARCH, DOUBLE SPEED PLAY	Relation between the periods of the CTL and CFG pulses				
				STILL, FRAME ADVANCE, SLOW	The discrimination data during play is held.				
6	I	Hi	HEAD SWITCH	Shifts the head switching punit)	oulse by 90° output from pin 31. (not used in this				
7-8, 13	3-14	Still control pi	ns (pin 13 is also used a	as a brake output in phase m	natching)				
7	I		BRAKE PULSE WIDTH	Determines the width of th	e delay pulse at pin 8.				
	I	Hi	CYL/CAPSTAN STOP	Cylinder/capstan start/stop and Lo. (in play and record	control. The cylinder and capstan motors rotate modes, etc.).				
8	I		BRAKE PULSE TIMING	Determines the output timi Quantitatively delays the fa	ing of the brake pulse during still. ill of the SW 25 Hz pulse.				
	I	Hi	CTL REC INHIBIT	CTL recording is inhibited	at Hi.				
13	0	Hi	BRAKE PULSE	Outputs a brake pulse during During phase matching	ng phase matching and still mode.				
	1			PAUSE PIN 17					
				SW 25 Hz PIN 31					
·		·		CYL PULSE PIN 4					
				Matches the phases of the	CTL pulse and vertical sync signal (SW 25 Hz)				

Pin	I/O	Active Level	Abbreviation	Function						
14	I		DRIVE PULSE WIDTH	Determines the width of the capstan drive pulse in the frame advance and still modes.						
9	I	Lo	REC SPEED	Tape speed input during recording. Judges LP or SP according to input level Hi, or Lo, and outputs is to pin 5. Tape speed is set into SP when Lo.						
10	I		CFG	CFG pulse input used for: The capstan speed control signal. Comparison signal in the record mode of the capstan phase control system (divided to 25 Hz) Tape Speed Recorded SP Mode NORMAL PLAY SEARCH SEARCH SOM SIGNATION SIGNATION SIGNATION SIGNATION SIGNATION SIGNATION SEARCH SOM						
11	I	Hi	SEARCH/F.ADV.	Hi sets the internal circuit to the search mode. Mid and Lo in the F.ADV mode determine F.ADV behavior. Mid stops the tape immediately when the F.ADV made is released. Lo executes noise band driving out operation when the F.ADV mode is released.						
12	0		CAPSTAN PHASE	Capstan phase control output. Outputs the PWM wave (1,082 Hz).						
15	0		CAPSTAN SPEED	Capstan speed control output. Outputs the PWM wave (8.6 kHz).						
16	I	Mid	CAPSTAN PHASE ADJUST	Mid: The PWM wave output is fixed at 50% duty.						
17	I		PAUSE/F.ADV	Pause, frame advance discrimination input. Hi: Frame advance Vcc/2: Pause						
		Hi	F.ADV	• The frame advance pulse (DRIVE PULSE) is output from pin 18 (CAPSTAN SERVO) by the frame advance command transmitted from the system control µP in the frame advance mode.						
		Mid	STILL (PB PAUSE)	A brake pulse is output from pin 13 (BRAKE PULSE) to stop the capstan in the still mode.						
17	I	Mid	REC PAUSE	The tape is rewound approxs. 2 sec by the pause input in the record pause mode. The ASSEMBLE pulse is output from pin 36 when the pause mode is released, and meanwhile, phase matching of the CTL pulse is performed and at the same time, the recording of the CTL pulse/ audio/video starts with the correct timing. That is, recording/erasing is inhibited while the ASSEMBLE pulse is Hi, and recording is started at the fall of the pulse.						
18-20		Capstan servo	I/O pins.							
18	0	\sim	CAPSTAN SERVO	· Capstan phase/speed control sum output.						
			DRIVE PULSE	· Frame advance pulse (DRIVE PULSE) output. Outputs a pulse with a width of 7 msec when the frame advance command (pin 17) is given from the system control μP in the frame advance mode.						
19	I		CAPSTAN PHASE	Capstan phase control addition input.						
20	I		CAPSTAN SPEED	Capstan speed control addition input.						
21	I	Hi	PWM +B	Power supply for the PWM generator in the phase control system (40 mA)						
22	I		fsc	$4.43~\mathrm{MHz}$ color subcarrier signal input. Divided up to 21 Hz to be used as the reference signal for the servo operation.						
23	0	Hi	Vcc/2	Outputs a voltage half the power voltage (5V) applied to pin 41.						

Pin	I/O	Active Level	Abbreviation	Function
24-28		Cylinder servo	control circuit.	
24	0	S	CYL SERVO	Cylinder phase/speed control sum output.
25	I		CYL SPEED	Cylinder speed control addition input.
26	I	\sim	CYL PHASE	Cylinder phase control addition input.
27	0		CYL SPEED	Cylinder speed control output. Outputs a PWM wave (2,165 Hz).
28	0		CYL PHASE	Cylinder phase control output. Outputs a PWM wave (2,165 Hz).
29	I	Mid	REVERSE	Mid decreases the cylinder speed by 2.4%. Hi sets the cylinder phase control PWM to 50% duty cycle to disable the cylinder phase control.
30	I	-	REFERENCE	Fine adjusts the REF 21 frequency in the record mode.
31	0		SW 25 Hz	Head switching 25 Hz (SW 25 Hz) pulse output.
32	I	Mid	RECORD	Determines mode. · REC: Mid · PB: Lo
33	I		VERT DRIVE PULSE PHASE	Determines the vert. drive pulse generation timing for CH-1.
34	I		VERT DRIVE PULSE WIDTH	Determines the width of the vert. drive pulse (width: 3H).
35	I		TACH DELAY	Determines the delay of the tach pulse and the phase of the SW 25 Hz pulse.
36	0		VERT DRIVE PULSE	Vert. drive pulse output. Outputs to suppress vertical jitter during trick play Outputs the assemble pulse in the assemble mode. SW25 Hz VERT DRIVE PULSE 230 us VARIABLE
37	I		CYL TACH CYL FG	Cylinder tach pulse (25 Hz) and cylinder FG (200 Hz) common input. The CYL tach pulse is supplied to the cylinder phase control system. The CYL FG pulse is supplied to the cylinder speed control system. FG & TACH PIN 35 PIN 31 CH-1 Determined by the pulse count
38	I		ASSEMBLE PULSE WIDTH	Determines the width of the ASSEMBLE pulse (audio/video recording inhibit output) during phase matching.
39	0		REC CTL	CTL pulse (25 Hz) output during recording.
40	1	Hi	+B	IC power supply (5V)
41	I		SYNC	 Vertical sync signal (50 Hz) is used as reference signal for cylinder phase control during recording. H. Sync is used for detection of noise in the still mode.
42	-	-	_	-

4.10 Timer Control IC (IC101) Pin Specifications

M50757-686SP

Functions: Clock/timer, display control (channel, present time, programmed time display), 2-week/4-program (2-week/3-program and 1 weekly) timer

Pin	I/O	Active Level	Abbreviation	Function
52	I	Hi	+B	μP power supply pin
50-43		10-phase grid	control outputs (Table	4-6)
50 49 48 47	0	Hi	G4 G5 G3, G6 G7	G4 and G8 are used as a clock pulse for transmission commands from the key input μP to the timer μP . (Table 4-1). G6, G7 and G8 are commonly used as scan pulses for the timer functions change over key matrix. (Table 4-5).
46 45 44 43			G8 G9, G10 G1 G2	
35-42,	1	Segment contr	rol outputs	
35 36 37 38 39 40 41 42	0	Hi	a b c d e f g h	8 ms G1 Segments lit as Shown on Table 4-6
34	I	_	Vdisp	Negative power supply for display (-27V)
32	I	↑ ↓	DATA (K-T)	Receives the tuning, timer and system control commands from the key input $\mu P. \label{eq:polyant}$
31	I	Н	VTR/ATR	Determines Audio/Video mode (Input)
30-29		Timer functio	n key matrix input (Tab	ole 4-5)
30 29	I I	,	MATRIX MATRIX	${\sf G6,G7}$ and ${\sf G8}$ are applied to these pins via the matrix circuit to perform the specified functions.
28 27	0 I	-	X'TAL X'TAL	Set μP reference frequency (32 kHz). Used at the clock pulse to increment the clock during power failure.
26	0	Lo	GND	Gronds μP.
25 24 23	0 0 I	- - -	X _{OUT} S X _{OUT} F X _{IN}	System clock oscillation. Circuit for Timer µP. Normal: 4MHz, during power failure: 40 kHz.
22	I	Lo	RESET	μP RAM reset input. · Displays »SUN 0:00 PF« with reset input.
21		-	_	GND
20	-	_	-	_
19	I	-	CLOCK	Basic clock pulse input for clock counting. Detects power failure from lack of 2 clock cycles, and shuts off the display lighting output.
18	I	1	REEL	Receives the reel pulses necessary to count the tape counter value.
15	0	Lo	MEMORY STOP	Memory stop output for tape counter. Set to Lo for 100 ms when the counter changes to »0000« from »0001« during rewind.
13	0	Hi	DOLBY	Hi is output to activate the DOLBY function in the audio circuit. Hi/Lo of this pin is controlled by the Dolby switch S9906.

Pin	I/O	Active Level	Abbreviat	ion	Fu	nction				
12	0	-	TV/VTR		RF output selection control output. · Hi: TV · Lo: VTR (playing)					
11	I	Н	EST		Receives a trigger pulse from the take-up end sensor to reset the tape counter at the rewind end or beginning of forward tape running.					
10	0	_	TV/VTR		No	t used				
9	-		_		_					
7	I	Н	REVERSE			ceives »Hi« to m uning.	ake the tape co	unter down cou	nt during revers	e tape
6	0	1	ACK REM	ОТЕ	No	t used				
2	0	_	VTR/ATR		Det	termines Audio/	Video mode (O	utput)		
3, 4, 5	, 8, 14, 1	6, 17	Communic	ation lins wi	th o	ther µPs				
3	I	1	CLOCK			ning pulse for d	data communication at pins 8 and 14 with system control			
4	I	↑ ↓	TU. REQU	EST	Th	Timing pulse for tuning μP to transmits the data (TU-T) to timer μP . The tuning μP starts data transmission at the fall, and timer μP receives the data at the rise.				μP. eceives
5	I	_	DATA (TU	J-T)	Communication data concerning channel selection and tuning. 8 bit serial pulse.					
8	I	_	DATA (S-	Τ)	Communication data between system control µP and timer µP.					
14	0	↑ ↓	DATA (T-	S)	Transmits data to system control μP . Transfers data while synchronizing with the clock at μP .					onizing
16	0	↑ ↓	T. REQUE	ST	Tir tra	ning pulse for the nsmission at its	mer µP to trans fall, and the tur	sfer the data (Taing µP receives	-TU) to tuning µ s the data at its	ıP. Starts rise.
17	0	_	DATA (T-	TU)	Coı	mmunication da	ta from timer µ	P to tuning μP.	8-bit seral pulse	•
		Table 4-5 I	Function of Tim	er Key Matr	ix					
			1	G8		(G7		G6	
	CON	CONNECTION YES NO		NO		YES	NO	YES	NO	
	Pin MA	29 TRIX 3	Disable GOTO function	Enable GOTO function	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Reference clock from mains	Reference clock from Xtal	1 program /2 weeks	4 programs /2 weeks	
	Pin 30 Disable 8-minute timer		8-minute	Enable 8-minute timer		60 times fast clock advance	Normal clock advance	Clock reference 60Hz mains	Clock reference 50 Hz mains	

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Bang&Olufsen

5.5 Tuning μP (IC701) Pin Specifications

Functions: Channel preset, Band/Channel selection, AFC/Muting control & Remote control

Pin	I/O	Active Level	Abbreviation	Function		
1-4, 13		Control the	EAROM			
1 2 3	0	Hi/Lo	C ₃ C ₂ C ₁	EAROM operation control outpput. »WRITE«, »READ«, »ERASE« of data between EAROM and Tuning μ P are controlled according to the state of these 3 pins. (Refer to Table 5-2).		
4	0	1	CLOCK	Timing pulse for data/address transfer between EAROM and Tuning µP.		
13	I/O	-	DATA	Tuning data and address data communication line between Tuning μP and EAROM. The input/output are determined by the commands at pins 1, 2, 3, and the data are transferrred synchronized with the clock at pin 4.		
5-8		Communicat	te with other µPs.			
5	I	-	DATA (T-TU)	Communication line of channel selection data, etc.		
6	0	-	DATA (TU-T)	Communicates data in a single direction with Timer µP. The data in each line is 8-bit serial pulse.		
7	I	†	T. REQUEST	Timing pulse for Timer μP to transfer the data (T-TU) to Tuning μP . Tuning μP receives data at the rise of the pulse.		
19	0	<u> </u>	TU. REQUEST	Timing pulse for Tuning μP to transfer the data (TU-T) to Timer μP . Timer μP receives data at the rise of the pulse.		
9-12		Key scan ou	itputs			
9 10 11 12	0	Lo	PHASE 3 PHASE 2 PHASE 1 PHASE 0			
14	0	Hi	DEFEAT	Defeat audio signal and AFC control output during channel selection. Sent to the IF circuit.		
15	0	Lo	GND	μP GND pin.		
16	0	Hi	AFC CONT	AFC control outputs. Hi: AFC ON Set to Lo with the BAND key or TUNING key is presses when presetting channels.		
17 18	0	Hi	BAND 1 BAND 0	Band selection outputs.		
				VH VL UHF		
				B ₁ (17) Lo Lo Hi		
				B ₀ (18) Lo Hi Hi		
8	I	Hi	FH DET	Channel preset operation is enabled to be finished, when Hi is applied.		
20	0	-	TUNING (VT)	Tuning control PWM output. This PWM output is inverted and smoothed by the external circuit to obtain the tuning voltage.		
21	I	-	IR PULSE	Remote control command input. Tuning μP decodes this and transfers the command code to System Control μP via Timer μP.		
22	I	Hi	AFC	The AFC detector output is applied to this pin. The tuning μP compares this voltage with the REF voltage at pin 23 and controls the tuning voltage at pin 20. When the specified AFC voltage is applied to this pin while »Hi« is being applied to FH DET pin 8, the tuning μP finishes search operation.		
23	I	-	REF	The reference voltage which will be compared with the AFC voltage at pin 22 is applied to this pin. This pin is used to discriminate whether the AFC voltage is the specified or not.		

Pin	I/O	Active Level	Abbreviation	Function	
24 25	I 0		OSC OSC	Set µP reference frequency. (4. OMHz)	
26	I	Lo	RESET	Presets µP. Clears the data to 0 when the power plug is connected.	
27 28	I	Lo Lo	MATRIX 1 MATRIX 0	Matrix inputs. A receivable band is determined by the voltage levels applied to these pins. (Refer to Table 5-3).	
29]-	_	_	GND	
30	I	Hi	+B	Power supply pin (5V).	

Table 5-2 EAROM Control Commands

C1, (3)	C2, (2)	C3 (1)	Commands and Details	
Hi	Hi	Hi	STAND BY Command for the data register and address register to hold their contents.	
Hi	Lo	Hi	ERASE Command to erase the address (channel number) data designated in the memory by the address register.	
Hi	Lo	Lo	ADDRESS INPUT Command to transfer the address data to the address register.	
Lo	Hi	Hi	READ Command for the data register to read the data out from the designated address.	
Lo	Hi	Lo	DATA OUTPUT Command to output the data in the data register.	
Lo	Lo	Hi	WRITE Command to write the data in the data register into the address area in the address register.	
Lo	Lo	Lo	DATA INPUT Command to transfer the input data to the data register. The address register is held.	

Table 5-3 Receivable Band

Pin 28 MATRIX 0	Pin 27 MATRIX 1	Receivable Band	
Open	Open	VHF LOW, VHF HIGH, UHF	
Ground	Open	UHF	
Ground	Ground	VHF HIGH, UHF	

Subject to change without notice

Bang&Olufsen

Beocord VHS 91 Hi-Fi			
Type No.	4491	4492	4493
TV system	B/G VHF + UHF	I UHF	B/G All Band tuner + UHF
Colour system	PAL/SECAM modified	PAL	PAL/SECAM modified
Cassette format	VHS	VHS	VHS
Remote control system	Built-in, for Video Terminal	Built-in, For Video Terminal	Built-in, for Video Termina
Tape heads	3 video, 2 Hi-Fi audio	3 video, 2 Hi-Fi audio	3 video, 2 Hi-Fi audio
Sound, compatible normal/Hi-Fi	Stereo, Hi-Fi sound	Stereo, Hi-Fi sound	Stereo, Hi-Fi sound
Stereo decoder			Stereo and bilingual
			TV-broadcasts
Max. playing time, audio/video	4 hours, E-240	4 hours, E-240	4 hours, E-240
Max. playing time, audio only	8 hours, E-240	8 hours, E-240	8 hours, E-240
Fast forward and rewind	Approx. 6 min. E-240	Approx. 6 min. E-240	Approx. 6 min. E-240
Still picture	Noise free, max. 6 min.	Noise free, max. 6 min.	Noise free, max. 6 min.
Step advance	1 frame	1 frame	1 frame
Search forward	4 x normal speed	4 x normal speed	4 x normal speed
Search rewind	4 x normal speeds	4 x normal speed	4 x normal speed
Counter	Electronic, 4 digits	Electronic, 4 digits	Electronic, 4 digits
TV channels	VHF 2-12, UHF 21-69	UHF 21-69	VHF 2-12, UHF 21-69
			S-channels S1-S20
Plav channel	UHF 37, (adjustable 30-39)	UHF 37, (adjustable 30-39)	UHF 37, (adjustable 30-39)
Number of programmes	39	39	39
Time programming	3 programming	3 programming	3 programming
	up to 14 days	up to 14 days	up to 14 days
	in advance, or daily,	in advance, or daily,	in advance, or daily,
	+ 1 weekly	+ 1 weekly	+ 1 weekly
Picture	. Woonly	- Wookiy	T I WOONLY
Frequency range black/white	3.5 Mhz, -26 dB	3.5 MHz, -26 dB	3.5 MHz, -26 dB
Signal-to-noise ratio	43 dB (CCIR 421-2)	43 dB (CCIR 421-2)	43 dB (CCIR 421-2)
Hi-Fi sound IEC/DIN	43 db (OOIII 421-2)	43 db (OOIN 421-2)	43 UB (COIN 421-2)
Frequency range	20-20,000 Hz ±3 dB	20-20,000 Hz ±3 dB	20-20,000 Hz ±3 dB
Dynamic range	>80 dB	>80 dB	>80 dB
Distortion	<0.5%	<0.5%	<0.5%
	55 dB	55 dB	55 dB
Channel separation Wow and flutter			
	<±0.005%	<±0.005%	<±0.005%
Normal sound	70.40.000.11= 1.0.40	70.40.000 11: 10.10	70.40.000.11 10.15
Frequency range	70-12,000 Hz ±8 dB	70-12,000 Hz ±8 dB	70-12,000 Hz ±8 dB
Signal-to-noise ratio	>50 dB (Dolby NR ON)	>50 dB (Dolby NR ON)	>50 dB (Dolby NR ON)
Managed States	>42 dB (Dolby NR ON)	>42 dB (Dolby NR ON)	>42 dB (Dolby NR ON)
Wow and flutter	<±0.3%	<±0.3%	<±0.3%
Other data	04		04
A/V, audio/video socket	21-pin	21-pin	21-pin
LINE IN, audio 7-pin dataling	50 mV/50 kohms	50 mV/50 kohms	50 mV/50 kohms
LINE OUT, audio 7-pin datalink	800 mV/600 ohms	800 mV/600 ohms	800 mV/600 ohms
Power supply	220 volts	240 volts	220 volts
Power frequency	50 Hz	50 Hz	50 Hz
Consumption at normal use	43 watts	43 watts	45 watts
Consumption at stand by	10 watts	10 watts	10 watts
Placement, min. height	22 cm	22 cm	22 cm
Ambient temperature	+10/+35 degrees	+10/+35 degrees	+10/+35 degrees
Relative humidity	30-80%	30-80%	30-80%
Dimensions W x H x D	48 x 10.5 x 37,5 cm	48 x 10.5 x 37,5 cm	48 x 10.5 x 37,5 cm
Weight	10 kg	10 kg	10 kg
Accessories			
Included	Aerial cable 6271134	Aerial cable 6271134	Aerial cable 6271134

Additional price	A/V cable 21-pin 6270285	A/V cable 21-pin 6270285	A/V cable 21-pin 6270285